

**Management Plan**  
**Fiscal Year 2014 Monitoring and Dixie**  
**National Forest**  
**Land and Resource Evaluation Report**

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**USDA, Forest Service, Region 4**

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## **EXECUTIVE SUMMARY**

This report presents a synopsis of monitoring results based on reports from the Dixie National Forest. The function of this report is to prompt managers to take a closer look at some of the monitoring items for possible amendments and/or consideration in Forest Plan revision, and provide information to the public who are interested in management on the Dixie National Forest.

Of the monitoring items identified in the Forest Plan and amendments, 21 (25%) indicate a variation causing further evaluation and/or change in management direction.

Forest Plan changes are recommended for 26 of the 85 monitoring items. 13 monitoring items are recommended for dropping or combining, and 13 items for changing wording or methods.

Recommendations based on these results are:

- 1) Conduct further evaluation of those items that exceed the stated variation and may indicate a need for change in management direction;
- 2) Use this document as need for change to the Forest Plan with revision as appropriate;
- 3) Review priorities previously identified for these monitoring items to establish priorities for future monitoring;
- 4) Review annual monitoring report requirements and frequency for appropriateness.



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# SECTION 1. INTRODUCTION

## A. Background

The Record of Decision on the Environmental Impact Statement for the Dixie National Forest Land and Resource Management Plan (Forest Plan) was signed in September of 1986. Since that time 27 plan amendments have been completed with the most recent being finished in August of 2013. The Forest Plan provides broad direction for managing resources to attain desired conditions. The Forest Plan is implemented by projects planned and implemented at smaller, more site-specific scales to move existing conditions toward the desired conditions. Implementation activities are generally identified by goals and objectives and guided by standards and guidelines.

Regulations<sup>1</sup> require monitoring in order to determine whether or not our actions are moving toward desired conditions and are being implemented within Forest Plan standards and guidelines. This is accomplished on a basis outlined in the Forest Plan (pages V-1 to V-13). Monitoring results may demonstrate needed changes in management direction<sup>2</sup>, goals, objectives, standards and guidelines, and/or monitoring methods. These changes generally require a Forest Plan amendment. Forest-wide and site-specific monitoring elements are listed in the Forest Plan on pages IV-4 to IV-12.

Many Forest Service personnel have conducted monitoring efforts over the past year. Persons compiling and evaluating the data in this report are as follows:

Developed Recreation and Scenic Resources	Rick Dustin
Dispersed Recreation and Wilderness	Nick Glidden
Wildlife	Ron Rodriguez
Fisheries	Mike Golden
Range	Mark Madsen and Chad Horman
Timber	Jim Gerleman
Soils and Water	Rich Jaros
Air Quality	Linda Chappell and Kevin Greenhalgh
Minerals	Sue Baughman
Lands	Kathy Slack
Facilities	Paul Dastrup, Jake Dodds, and Steve O'Neil
Protection – Fire	Linda Chappell and Kevin Greenhalgh
Protection – Insects and Diseases	Jim Gerleman
Economics	Marcia Gilles

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<sup>1</sup> Title 36 Code of Federal Regulations 219.11 (d).

<sup>2</sup> Title 36 CFR 219.12 (k).



## **B. Format**

This report is organized corresponding to monitoring items listed in the Forest Plan, Chapter V, pages IV-1 to IV-13 plus Forest Plan amendments by resource. Each monitoring item is divided into six parts, which are described below:

Methods. This includes the methods prescribed in the Forest Plan and may include specifics regarding the item monitored. Where applicable, other methods used are also discussed.

Variation. For each monitoring item, the Forest Plan describes “Variation which would cause further evaluation and/or change in management direction.” This is described in this report as “Variation.” Where Forest Plan direction or goals are referenced, the page number and brief description is included. The extent to which further evaluation is needed and if further actions are warranted is not determined in this report.

Results. A summary of results from specialist reports is provided. More detailed information can be obtained from these reports.

Interpretation. The results are compared to the variation that may cause further evaluation and/or a change in management direction: “Are variations exceeded?” The monitoring results are described regarding what it means to the resource or the Forest Plan: “What are the implications?” “Conclusions” describe the consequences to the resources indicated by the results and implications.

Monitoring Resources Available. The availability of funding and/or labor to accomplish the monitoring is presented.

Recommendation. This section answers questions such as, “Should we continue to monitor?” and, “Is the monitoring identified in the Forest Plan still appropriate?” The recommendations identify items needing further analysis and do not suggest solutions. Solutions will be determined with the further analysis triggered by the variation.

Goals and objectives are identified in Section 20 with a brief statement whether or not they have been attained. Reasons for non-attainment are not included. If part of a goal was attained and another part not attained, it was counted as not attained overall in this report.

The last section of this document summarizes the results and recommendations regarding monitoring priorities, items where a variation is causing a further evaluation and/or change in management direction, and if a Forest Plan amendment is recommended. Results of Forest Plan objective attainment are also included.

## SECTION 2. DEVELOPED RECREATION – PUBLIC

### A. Condition of Facilities

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Condition of Facilities (whether the condition of developed facilities is declining from the current situation).	Annual RIM Reports - Total \$ needed to bring facilities to Condition Class 1; Measure bi-annually; Five-year reporting frequency.	H/M	Five year average exceeds 1985 by 5%

#### Methods.

The district recreation staffs monitor 20% of developed recreation sites every year and data is put into INFRA in October or November.

#### Variation.

Objective (b) in the Forest Plan relating to Developed Recreation Facilities is to bring the condition of the facilities to Condition Classes 1 or 2 by the year 2000 (page IV-1; Classes range from 1-5, with 5 being primitive and 1 most developed, with hardened sites, flush toilets, etc.). In addition, recreation facility water and sewage systems were to meet State standards by the year 2000 (page IV-1). The objective of this measure is to determine whether the conditions of developed facilities have improved or are declining from the 1986 condition.

#### Results.

The direction is to do developed recreation condition surveys on 20% of the sites each year. This was done and entered into INFRA. Survey data found that not all sites were being maintained to standard. Due to the lack of funding only critical health and safety issues are addressed. Newly constructed sites like: Pine Valley Recreation Area, King Creek Group Site and Posey Lake meet all or most standards.

Accessibility and ADA standards are met each time dollars are spent (i.e. a picnic table replacement). However access to that table may not meet the desired standard because of the lack of funding.

The forest began “Recreation Site Facility Master Planning” in March of 2006. The recommended time line for this document was five years. This plan makes an essential connection between projected budgets, annual O&M, our INFRA data and the forest niche identification.

Recreational Site Inventory (RSI) objectives:

- Operate and maintain sites to standard with available revenue stream.
- Reduce deferred maintenance by 29% over the next five year life of the plan.
- Focus available resources on sites which conform most closely to the Forest Recreation Program Niche.

- Maintain and enhance customer satisfaction with available sites.

### **Interpretation.**

**Is further evaluation needed?** The Forest started (RSI) in 2014 and will finish plans on doing “Recreation Site Facility Master Planning” (RSI) in 2015. This will refocus our limited dollars and may move us to decommission some developed sites.

**What are the implications?** Conditions of facilities have improved at Pine Valley Recreation Area, Honeycomb Rocks CG, King Creek Group Site; Duck Creek loop “B”, and Posey Lake CG. Other sites like Pine Lake CG and Blue Spruce CG continue to decline. Water systems at Spruces CG and Deer Haven CG are being worked on with Granger-Thye funding.

**Conclusion.** Declining budgets and no capital improvement projects (CIP) make it hard to reduce deferred maintenance. Limited dollars from concessionaire receipts are not keeping up with the decline of facility condition.

### **Monitoring Resources Available.**

Monitoring information is available through Infra, National Visitor Use Monitoring (NVUM) and Recreation Site Inventory (RSI)

### **Recommendation.**

Continue monitoring efforts on condition of facilities. Consider changing wording and changing the method of measure and/or monitoring frequency. RSI will help us set priorities for recreation sites and may force us to decommission sites and or water systems. Meeting class 1 or 2 development level for all sites is not a desired ROS goal or a financially feasible alternative at this time.

## B. Soil and Vegetation Loss

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil and Vegetative Loss at Developed Sites.	Transects, photo points at selected key sites; monitoring and reporting every five years.	H/M	Campsite condition below Class III using the Limits of Acceptable Impact.

### Methods.

INFRA data was collected in fiscal year 2014.

### Variation.

The variation causing further evaluation for this measure in the Forest Plan is when campsite conditions fall below Class III using the Limits of Acceptable Impact. "Limits of Acceptable Impact" is a process to identify thresholds of acceptable impacts from use. In developed sites, it refers to the threshold or limit of conditions where the public would no longer visit the site because of deteriorated or undesirable conditions.

Forest Plan direction is to develop and implement a vegetative prescription for each developed site (page IV-2).

### Results.

Forest wide concessionaire does maintenance on all campgrounds yearly. Visitation to campgrounds was 101,687 people with 41,891 days occupied. The overall occupancy at campgrounds for the forest is at 48.4%. Some high use campgrounds were:

- Dean Gardner at 86.2%,
- Red Canyon is at 81.2%
- Yellow Pine at 68%

Low use campgrounds were:

- Deer Haven at 14.2%,
- Blue Spruce at 15.1%.

All data indicates that soil and vegetation impacts are a result of over use of occupancy in isolated locations. Data shows that we are not close to over using sites.

### Interpretation.

**Is further evaluation needed?** Forest will continue monitoring 20% of developed recreation sites. The Infra data system will continue to be our place holder for monitoring data.

**What are the implications?** Infra data will show us if trends change.

**Conclusion.** Soil and vegetation at developed sites are being maintained.

### Monitoring Resources Available.

INFRA, NVUM, Yearly Concessionaire Report.

## Recommendation.

Continue monitoring efforts on soil and vegetation loss at developed sites.

## C. Facility Capacity and Developed Site Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Facility Capacity (whether construction and reconstruction of facilities is keeping pace with demand)	Annual PAOT, PAOT-Days, with five-year reporting frequency.	H/H	PAOT and PAOT-Days greater than or equal to 90% of projected demand.
Developed site use – Amount and distribution (does demand exceed supply?)	Annual double sample indicator sites, random sample all fee sites, with annual reporting frequency.	M/M	Use of an individual site exceeds 60% of theoretical capacity for the summer season or daily use exceeds capacity on more than 5% of the days in the summer season. The five-year average developed site use for the Forest varies from projected demand by more than 20%.

## Methods.

NVUM, INFRA and Concessionaire report.

## Variation.

Forest Plan Objective (a.) under Goal No. 1 is: Program to add facilities with a capacity of 875 PAOT to the current 5895 PAOT by 2020.

Forest Plan Direction for this goal is:

“Develop the following new sites to accommodate increased use:

1985-1995	Deer Creek - 250 PAOT
1995-2005	Blue Springs Point - 250 PAOT
2005-2015	Pine Valley - 250 PAOT
2015-2025	Fish Creek Lake - 125 PAOT

Rehabilitate and define the following sites to accommodate increased use:

1985-1995	Spruces - 160 PAOT, Cedar Canyon - 95 PAOT
1995-2005	Duck Creek - 395 PAOT
2005-2015	Juniper Park - 110 PAOT, Blue Springs - 100 PAOT
2015-2025	Kings Creek - 225 PAOT
2025-2035	Te-Ah - 210 PAOT”

Measuring these objectives will determine whether construction and reconstruction of facilities is keeping pace with demand. In order to determine demand, facility use data are needed. Therefore, this monitoring item and Developed Site Use monitoring are addressed together.

The variation causing further evaluation for visitor use is when use of an individual site exceeds 60% of theoretical capacity for the summer season, or daily use exceeds capacity on more than 5% of the days in the summer season. Also, the five-year average developed site use for the Forest varies from projected demand by more than 20%.

### **Results.**

Campground percent occupancy for 2014 was 41.9%. Existing supply does not exceed demand except for group sites.

### **Interpretation.**

**Is further evaluation needed?** The forest could consider adding more group sites. However given existing budgets, no capital improvement projects funded and the fact we cannot maintain what we have, it is not recommended.

**What are the implications?** Large groups will need to find other alternatives.

**Conclusion.** None of the campgrounds are at capacity. Concessionaire reports provide data on use and NVUM provide satisfaction levels of public.

### **Monitoring Resources Available.**

Concessionaire reports come yearly, INFRA data is updated yearly and NVUM is done every five years (2014).

### **Recommendation.**

Continue monitoring efforts on facility capacity and developed site use.

## D. Developed Site Service

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Developed Site Service (whether Forest is able to provide service scheduled in the plan)	Annual PAOT-Days FSM (to standard), Mgmt. Attainment Report Item #26, with five-year reporting frequency.	H/H	PAOT-Days FSM (standard) five-year average exceeds or declines from the Forest Plan objective by 10%.

### Methods.

Maintained in conjunction with Concessionaire permit schedule.

### Variation.

The objective of this measure is to determine whether the Forest is able to provide developed site service scheduled in the Forest Plan. The Forest Plan direction (b) for Goal No. 1 states: "Regulate the opening and closing dates of facilities to serve the public in an efficient and economical manner." Standards and guidelines for managing developed recreation sites state that they be managed "at full service when at least one of the following are met and funding is available to meet them:

- A. A campground is a designated fee site;
- B. More than 20 percent of theoretical capacity is being utilized;
- C. A group campground or picnic ground has a reservation system and/or user fee; or
- D. The site is a swimming site, a boating site with a constructed ramp, or at staffed visitor information center."

### Results.

All 31 campgrounds are being managed at full service. All have user fees and all have some level of use from a reservation system.

Each year the forest and the concessionaire meet to approve the operating plan. This includes proposed opening and closing dates of campgrounds, maintenance needs, Granger-Thye project approval, required walkthrough dates prior to opening to make sure all requirements are met (like hazard trees are down and water system is up and running) and water testing is done and turned in on each site.

### Interpretation.

**Is further evaluation needed?** Forest completed National Visitor Use Monitoring (NVUM) in 2014. NVUM is done every five years.

**What are the implications?** Concessionaire reports yearly on use and NVUM reporting every five years on satisfaction levels.

**Conclusion.** Concessionaire reports show use is up from 85,861 in 2012 to 96,687 in 2013 to 101,698 in 2014.

**Monitoring Resources Available.**

Concessionaire yearly report, NVUM.

**Recommendation.**

Continue monitoring efforts on developed site service.



## SECTION 3. DEVELOPED RECREATION – PRIVATE

### A. Downhill Ski Area Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Downhill Ski Area Use (is it increasing as projected?)	Annual ski area attendance reports; five-year reporting frequency.	H/H	Five-year average varies from projected demand by more than 20%.

#### Methods.

Annual ski area attendance reports.

#### Variation.

Five-year average varies from projected demand by more than 20%. The projected demand for downhill ski use in the Forest Plan for the 1990 period was 426,000.

#### Results.

Skier-days at Brian Head Resort are less than 50% of capacity.

#### Interpretation.

**Is further evaluation needed?** No. The expected use was much less than projected, varying more than 20% from the projected demand of 426,000.

**What are the implications?** Forest Plan direction for ski area management was based on projected increased use that has not been realized.

**Conclusion.** This measure shows that Brian Head Resort has been able to operate over time. The use at Brian Head is not under Forest Service control; monitoring this item would not prompt a management change.

#### Monitoring Resources Available.

Recreation use data is gathered by Brian Head Resort under Special Use Permit.

#### Recommendation.

Drop this monitoring item.

## B. Organization Site Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Organization Site Use (are existing sites being fully utilized?)	Permittee occupancy plan, pre-season occupancy reports, post-season regular visits to check occupancy; measure 1 <sup>st</sup> , 5 <sup>th</sup> , 10 <sup>th</sup> year; five-year reporting.	H/H	Unreported private sector vacancies on Forest Land exceeding 10% of the summer season or reported and inventoried vacant periods for which no reservations are received.

### Methods.

The Forest reviews facilities annually in organization sites to ensure that all requirements of the special use permit are being met.

### Variation.

Unreported private sector vacancies on Forest Land exceeding 10% of the summer season or reported and inventoried vacant periods for which no reservations are received.

### Results.

The Forest has one organization camp and the permit requirements are being met.

### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** This monitoring item is not revealing meaningful information.

### Monitoring Resources Available.

The special use permit is reviewed annually.

### Recommendation.

Consider dropping this monitoring item.

## SECTION 4. DISPERSED RECREATION

### A. Dispersed Visitor Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Dispersed Visitor Use (summer and winter)	Annual road counters, parking lot counts, trail counters, RIM reports; five-year reporting.	M/L	Visitor use varies from projected demand by greater than 20%.

#### Methods.

The Dixie NF uses both active and passive infrared trail counters, as well as electromagnetic vehicle/trail counters.

#### Variation.

Visitor use varies from projected demand by greater than 20%. The projected demand in the Forest Plan for Dispersed Use was 843,100 RVDs for 1990, and 1,129,900 in 2000 (page II-9).

#### Results.

Dispersed recreation use numbers increased slightly from the previous year. Most trail counts were static or slightly higher. These findings may be due to stabilization in the economy. Most of the high-use trails tend to be either scenic destination and/or mechanized/motorized routes. Across the Forest, non-motorized use numbers were higher in 2014 than previous years.

#### Interpretation.

**Is further evaluation needed?** Unknown. Traffic counters alone do not give sufficient information to conclude if limits were met.

**What are the implications?** The types of dispersed uses occurring on the Forest were not anticipated in the Forest Plan. The measures prescribed in the Forest Plan are not suitable or sufficient to determine if projected demand has been exceeded.

**Conclusion.** Further monitoring of these trails is necessary to create a database with baseline data. The Dixie National Forest has been consistently monitoring dispersed recreation use for the last five years on most trails listed. In order to monitor change over time, trail data needs to be collected, analyzed, and stored annually. With an increasing population growth and an increasing recreating public, trail use is expected to increase. The Dixie National Forest is especially susceptible to increased use due to its proximity to the fast growing city of Las Vegas. In addition, the Dixie National Forest provides many recreation opportunities for motorized recreation, which is the fastest growing sport in the United States.

## Monitoring Resources Available.

There are insufficient funds to monitor dispersed recreation use on the Dixie National Forest in its entirety. The current cost for an individual trail counter is around \$450. With 280 trails constituting 1,600 miles of trails, it is unlikely the Dixie National Forest will ever have the funding or personnel to adequately monitor all dispersed recreation; however, each year the Forest has been able to increase the number of routes monitored and the accuracy of the data collected.

## Recommendation.

Monitoring of dispersed recreation use needs to continue on an annual basis on the Dixie National Forest. Dispersed recreation monitoring by the use of trail counters allows managers to determine current conditions and how use numbers may be changing over time. In addition to number monitoring (trail counters), occurrences of illegal motor vehicle use should be monitored as well to track visitor compliance with the Forest Motor Vehicle Use Map.

## B. Site Condition

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Site Condition (Limits of Change)	Photo points, transects key sites adjacent to water, every five years; five-year reporting.	H/M	Campsite condition below Class III using the Limits of Change Table 1.

## Methods.

No data collected in fiscal year 2014.

## Variation.

Campsite condition below Class III using the Limits of Change Table 1. This is assumed to be Limits of Acceptable Change (LAC).

## Results.

A “Limits of Acceptable Change” process has not been conducted and documented on the Dixie National Forest.

## Interpretation.

**Is further evaluation needed?** Yes, there is a variation on the campsite inventories of data collected to date.

**What are the implications?** Frissell<sup>3</sup> is a subjective measure, rating root damage, bare soil, and vegetation damage, and does not indicate impacts since it does not compare to natural

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<sup>3</sup> Frissell, Sidney S. 1978. Judging recreation impacts on wilderness campsites. Journal of Forestry. 76(8): 481-483. IN: USDA Forest Service Proceedings RMRS-P-15-VOL-5. 2000.

conditions. Southern Utah is arid, resulting in naturally-occurring soil exposure. This may not equate into undesired impacts from use.

**Conclusion.** Dispersed sites have exceeded expectations in the Forest Plan.

### **Monitoring Resources Available.**

Resources for inventories have not been available. Further staffing may not be available to collect data on remaining sites.

### **Recommendation.**

Consider dropping use of Limits of Acceptable Change and use of Frissell Classes.

Close or rehabilitate campsites that fall below a Class III that are showing unacceptable impacts. Determine the number of campsites needed to meet demands and locate those sites to minimize resource impacts while meeting the needs of the public. Research has shown that it is best to keep open heavily-used sites if other resources are not being impacted and close sites with minimal impacts. Since highly-impacted sites can be difficult and costly to rehabilitate and close, they are often best left open, thereby reducing the spread of impacts to other areas.

## **C. Trail Condition**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Trail condition	Trail condition surveys, 25% annually; reporting every four years.	H/M	Trail mileage classed as inadequate (substandard) exceeds the current inadequate mileage shown in the AMS.

### **Methods.**

Trail condition surveys.

### **Variation.**

Trail mileage classed as inadequate (substandard) exceeds the current inadequate mileage shown in the Analysis of the Management Situation (AMS) in the Forest Plan. The AMS (page II-10) states that at the time of Plan preparation, 462 miles were inadequate, and 175 were adequate.

### **Results.**

The Forest did not conducted trails inventories during the 2014 season.

### **Interpretation.**

**Is further evaluation needed?** Unknown. Data is not sufficient to determine. The forest may not be able to collect trail condition surveys on 25% of the forest annually and reporting the data every four years.

**What are the implications?** More trails may be substandard than when the Forest Plan was developed.

**Conclusion.** More data analysis is needed to determine mileages of trails in substandard condition.

#### **Monitoring Resources Available.**

Resources to conduct this monitoring have not been available.

#### **Recommendation.**

Continue to inventory trails on the Forest. Once all trails have been inventoried, establish a funding level to keep trails at their management objective. If funding is not available to meet objectives for all trails, seek volunteers or groups to help maintain critical trails or seek to close those trails with little or no use. Close trails that are no longer needed.

Many of the trails are not adequate to accommodate motorized use. With this type of use rapidly increasing, an adequate motorized trail system needs to be identified and established within motorized ROS classes.

### **D. Shifts Between ROS Classes**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Shifts between ROS Classes	Ten-year ROS mapping and reporting.	M/L	If the change between classes is 5% greater than predicted.

#### **Methods.**

In 2002, Geographic Information System (GIS) technologies were used to review the Forest Recreation Opportunity Spectrum (ROS). The different ROS classes (Roaded Natural, Semi-Primitive Motorized, Semi-Primitive Non-Motorized, and Primitive) were identified according to their distance from motorized roads. This effort has not been completed.

#### **Variation.**

If the change between classes is 5% greater than predicted.

#### **Results.**

When the inventory is completed, a comparison can be made of ROS classes that were identified when the Forest Plan was developed.

#### **Interpretation.**

**Is further evaluation needed?** Unknown. Results have not been completed and compared to 1986 ROS mapping.

**What are the implications?** Further analysis is needed.

**Conclusion.** Further information is needed to evaluate ROS classes.

**Monitoring Resources Available.**

Complete the ROS inventory and review.

**Recommendation.**

Complete the ROS inventory and compare to 1986 ROS mapping.

## SECTION 5. WILDERNESS

### A. Campsite Condition

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Condition of campsites and surrounding area (are conditions declining from the current situation?)	Limits of Change at key sites, 5-years monitoring and reporting.	H/M	Limit of Change analysis shows that the Condition Class has declined one class on 25% of inventoried sites.

#### Methods.

No data collected in fiscal year 2014. This is a five year monitoring recurrence.

#### Variation.

Limit of Change analysis shows that the Condition Class has declined one class on 25% of inventoried sites.

#### Results.

No results in fiscal year 2014.

#### Interpretation.

**Is further evaluation needed?** No, past data are lacking with which to compare recent data regarding the Limit of Change analysis to determine if the Condition Class has declined one class on 25% of inventoried sites. Six (6%) of the inventoried sites are in Frissell Class 4. Based on initial findings, use does not exceed capacity.

**What are the implications?** If the Limit of Change has been exceeded and use trends continue, resource damage could occur.

**Conclusion.** Monitoring to compare existing data is needed to assess potential implications.

#### Monitoring Resources Available.

Forest funding is needed to compile this monitoring. The wilderness campsite condition monitoring will occur in fiscal year 2015.

#### Recommendation.

Continue to monitor recreation use, campsites, and vegetation plots with methods to allow for recent science.



## B. Human Use

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Amount and distribution of human use	Annual trail registration, trail counters, and trailhead counts with periodic intensive sample; annual reporting.	M/M	Human use exceeds area capacity identified in this plan.

### Methods.

Trail registration boxes and trail counters were placed at various locations on the Forest.

### Variation.

Human use exceeds area capacity identified in the Forest Plan. The capacity estimated in the Forest Plan is 26,500 RVDs (page II-13).

### Results.

Although trail registration data was collected, the regularity and meaning of the data are lacking in order to justify displaying the results.

### Interpretation.

**Is further evaluation needed?** Unknown. Data collected are not sufficient to draw conclusions.

**What are the implications?** Unknown.

**Conclusion.** Trailhead registration and trail counters do not provide suitable data to draw conclusions regarding use.

### Monitoring Resources Available.

There are insufficient funds to monitor human use on the Dixie National Forest. It is unlikely the Dixie National Forest will ever have the funding or personnel to adequately monitor all human use impacts; however, each year the Forest has been able to increase the number of routes monitored and the accuracy of the data collected.

### Recommendation.

Consider changing methods of monitoring of human use.

## SECTION 6. CULTURAL RESOURCES

### A. Cultural Resource Investigations

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Completion of cultural resource investigation for all site-disturbing projects where no inventory has been completed in the past.	Annual management review and reporting.	H/H	Failure to accomplish is a performance problem and does not indicate a need to change management direction.

#### Methods.

Management review of 2014 cultural resource survey.

#### Variation.

Failure to accomplish is a performance problem and does not indicate a need to change management direction.

#### Results.

14 cultural resources investigations were completed on ground-disturbing projects during 2014. A total of 110 sites were recorded on 1,500 acres surveyed.

**Number of projects, acres surveyed and number of sites recorded of heritage resource surveys on the Dixie National Forest during 2014.**

Year	Number of Projects	Acres Surveyed	# Sites Recorded
2014	14	1,500	35

#### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** Site-disturbing projects are being surveyed as needed.

#### Monitoring Resources Available.

Budgeting to support surveys for site-disturbing projects have been adequate.

#### Recommendation.

Continue to survey site-disturbing projects.

## SECTION 7. SCENIC RESOURCES

### A. Compliance with Visual Quality Objectives

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with Visual Quality Objectives	Annually, Landscape Architect evaluate one retention corridor selected at random, Landscape Architect evaluate a minimum of two or 10% (whichever is more) of previous year's projects, selection at random from list of previous year's completed projects; annual reporting.	H/M	Corridor contains more than 2% of view area which does not conform to the Visual Quality Objective, more than one sampled project does not meet VQO in a given year, or one or more projects in two successive years do not meet VQO.

#### Methods.

In 1996, the Forest Service changed direction from USDA Handbook 462, *The Visual Management System* to USDA Handbook 701, *Landscape Aesthetics: A Handbook for Scenery Management* (October 1996). The Chief of the Forest Service directed employees to "...begin using the concepts and terms contained in this Handbook as you work on new projects or initiate Forest Plan revisions." As a result of this direction, the Dixie changed to the Scenery Management System (SMS) and to Scenic Integrity Objectives (SIO) instead of Visual Quality Objectives. Following these directions, the Forest was completely remapped in 2000 using the new system and a Forest Plan amendment was completed.

#### Variation.

Corridor contains more than 2% of view area which does not conform to the Scenic Integrity Objective, more than one sampled project does not meet SIO in a given year, or one or more projects in two successive years do not meet SIO.

#### Results.

Along the major travel routes with heavy use by those interested in the scenery, the Scenic Integrity Objective (SIO) has a high scenic integrity and the valued landscape character appears to be intact. In a landscape with a moderate scenic integrity, the valued landscape may appear slightly altered.

Most of the major travel corridors on the Cedar City District have received management activities during this monitoring period. These activities have been treatments in response to the spruce beetle infestation occurring on the District. Some of these management activities need evaluation of the SIOs along the major travel corridors. Highway 14 has improved by dramatically in 2013 and 2014. Logging of dead spruce, burning of log decks and aspen regeneration has improved and changed the landscape character.

The Powell District had two timber sales along major travel corridors. Portions of East Creek are located along the Great Western Trail that should be managed to retain a high Scenic Integrity Objective. Timber removal in these areas thinned the stands to existing levels, but

managed to retain the scenic character of these ponderosa pine stands. Some implementation progress was made on these projects in 2014.

**Interpretation.**

**Is further evaluation needed?** Yes. Due to beetle infestations and subsequent harvesting, there are areas that need evaluation of SIOs. In 2015 the Central and New Harmony Fuel breaks will need monitoring.

**What are the implications?** Scenic views have been impacted.

**Conclusion.** Stochastic events such as beetle infestations can impact scenic integrity over which the Forest has no control.

**Monitoring Resources Available.**

Forest Landscape Architects conduct most of the monitoring with some assistance from the Districts.

**Recommendation.**

Change Forest Plan to correspond current monitoring with using the Scenery Management System. Areas involved in the insect infestation should be identified with an interim SIO<sup>4</sup> until a plan can be developed to bring the visual characteristics back in line with a high scenic integrity along travel corridors. Develop a vegetation management strategy for Management Area 2B, travel corridors. The goal would be to maintain forest health and prevent further outbreaks of insects and disease, thus maintaining the scenic variety of the landscape most seen by the public.

It is recommended that monitoring needs to be done on Scenic Stability. This is a study of age class of forested areas, fuel loading and the probability of catastrophic fire or beetle infestation. This information will help make informed decisions about priorities for timber and fuel treatments to sustain high quality scenery and meet the assigned SIO.

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<sup>4</sup> SIO is Scenic Integrity Objectives

## SECTION 8. WILDLIFE AND FISH

### A. Big Game

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Big game (mule deer and elk)	Annual UDWR harvest and classification data, winter range rides, aerial reconnaissance, pellet transects; annual reporting.	M/M	Prior to reaching optimum Forest populations, a downward population trend of 10% over 3 years. Once optimum populations are reached, a 20% total population or hard [herd] composition change over a five-year period.

#### Methods.

UDWR classification data, winter range rides, and aerial reconnaissance were used in monitoring these species. Data were primarily collected by UDWR and evaluated by the Forest Service.

#### Variation.

Prior to reaching optimum Forest populations, the variation causing further evaluation is a downward population trend of 10% over 3 years. Once optimum populations are reached, variation is 20% total population or herd composition change over a five-year period. Optimum populations are considered as management unit objectives established by the UDWR. These population goals are changed by the state on an as needed basis.

#### Results.

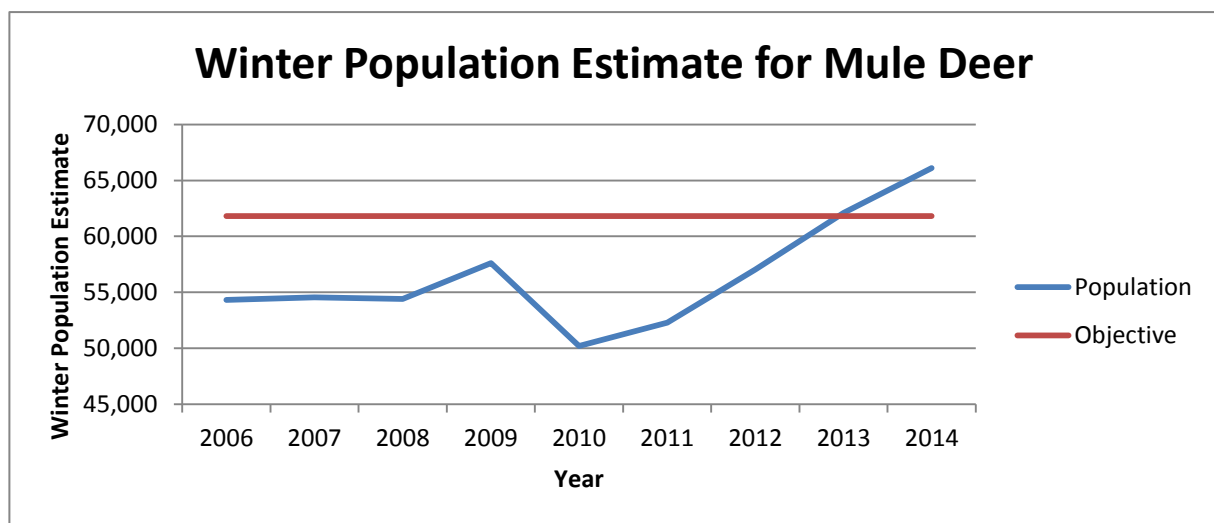
##### Mule Deer and Rocky Mountain Elk

The Dixie NF contains portions of seven different Wildlife Management Units (WMUs) in the Southern Region: Boulder Plateau, Kaiparowits, Mount Dutton, Panguitch Lake, Paunsaugunt, Pine Valley, and Zion. Currently, elk habitat has not been defined within the Pine Valley WMU, although the Utah Division of Wildlife Resources (UDWR) manages a limited number of elk in the area. The deer and elk numbers listed below come from data that is being used in the 2014 Utah Big Game Annual Report (UDWR 2015, Heather Bernales; Utah Division of Wildlife Resources (UDWR). 2015. Utah Big Game Annual Report, Teresa Griffin.)

### Mule Deer Winter Population Estimates by WMU

WMU	% Suitable habitat within Dixie NF	Management Plan Objective	2008	2009	2010	2011	2012	2013	2014
Boulder Plateau	50%	22,600	12,000	15,500	12,500	12,800	16,500	16,200	17,400
Kaiparowits	3%	1,000	1,000	400	400	400	400	400	400
Mount Dutton	62%	2,700	2,500	2,400	1,800	1,900	2,250	2,600	2,900
Panguitch Lake	61%	8,500	10,000	10,500	8,100	8,500	9,200	11,700	11,700
Paunsaugunt	15%	5,200	6,000	5,800	4,900	5,200	5,200	5,200	5,200
Pine Valley	55%	12,800	13,400	13,400	12,600	13,000	12,500	13,000	13,500
Zion	9%	9,000	9,500	9,600	9,900	10,500	11,000	13,000	15,000
<b>Total:</b>	<b>35%</b>	<b>61,800</b>	<b>54,400</b>	<b>57,600</b>	<b>50,200</b>	<b>52,300</b>	<b>57,050</b>	<b>62,100</b>	<b>66,100</b>

The chart below displays the data provided in the table above.



\*Objective determined in Deer Management Plan

The Dixie NF contains summer, winter, and year-round habitat for mule deer populations. Amount of habitat varies with WMU, and altogether the Dixie National Forest administers only 35% of suitable habitat within the seven WMUs. Accurate estimates of populations on the Boulder Plateau are obscured due to the addition of the Fishlake and Thousand Lakes Boulder units. The Boulder and Kaiparowits units are under objective. The Paunsaugunt unit is at objective, and the Panguitch, Pine Valley and Zion Units are above objective. Mule deer population numbers within and adjacent to National Forest have increased from 2013 by 4,000 head. Mule deer numbers across the Forest are healthy, well distributed and will continue to persist across the Forest.

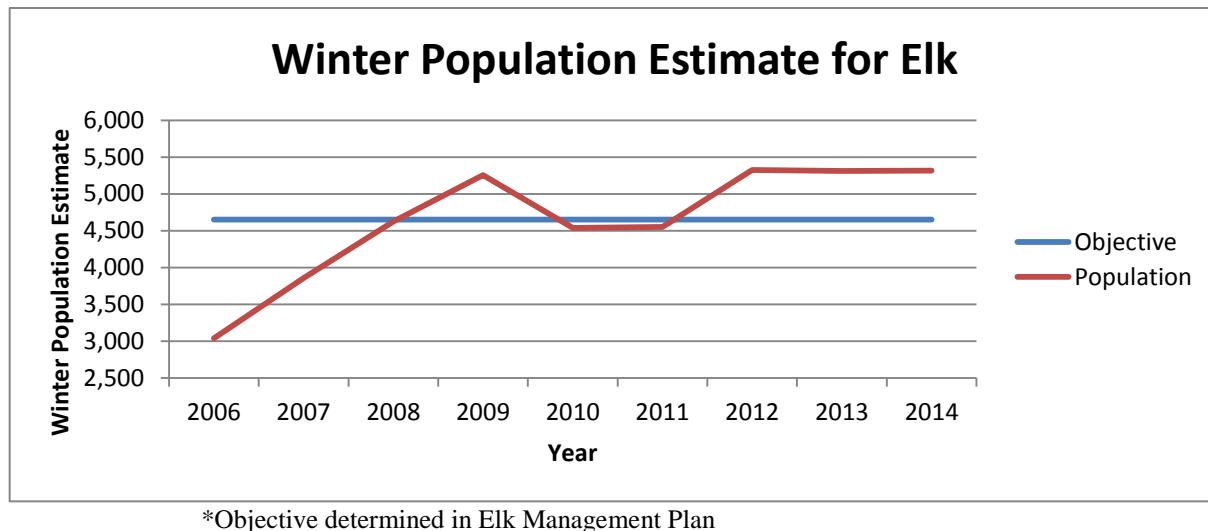
All big game species in Utah are managed by the UDWR. The Regional Advisory Council (RAC) process is used to make population management recommendations, and the Utah Wildlife Board makes all decisions on population management. The Forest Service has a representative on the RAC; however, the Forest in no way has control over population numbers. It should be noted that a WMU may be within approved population objectives, and as a result of UDWR management strategies, population numbers may be reduced. Many factors can influence big game populations, such as drought, severe winter, predation, catastrophic fire and disease. All of these natural events can influence populations in the period of a year or over time. Deer populations appear to be healthy and will continue to persist across the Forest.

The table below displays winter population estimates from 2006-2014 for elk in the six WMUs that overlap the Dixie NF.

**Elk Winter Population Estimates by WMU**

<b>WMU</b>	<b>% Suitable habitat in Dixie NF</b>	<b>Management Plan Objective</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>
Boulder Plateau	58%	1,500	500	900	1,500	1,800	1,500	1,350	1,600	1,700	1,700
Kaiparowits	51%	25	25	25	25	25	50	25	25	25	25
Mount Dutton	77%	1,500	1,270	1,400	1,500	2,000	1,750	1,800	2,150	1,900	1,900
Panguitch Lake	75%	1,100	872	950	1,000	800	775	850	1,000	1,100	1,100
Paunsaugunt	33%	175	24	30	50	100	140	150	175	175	175
Pine Valley	NA	50	50	50	50	50	50	50	50	60	75
Zion	5%	300	300	500	500	480	275	325	325	350	340
<b>Total:</b>	<b>54%</b>	<b>4,650</b>	<b>3,041</b>	<b>3,855</b>	<b>4,625</b>	<b>5,255</b>	<b>4,540</b>	<b>4,550</b>	<b>5,325</b>	<b>5,310</b>	<b>5,315</b>

The chart below displays the data provided in the table above.



The Forest contains summer, winter, and year-round habitat for elk populations. The amount of habitat within the Forest varies with WMU, and altogether the Dixie National Forest administers only 54% of suitable habitat within the six WMUs. The Kaparowits, Paunsaugunt, and Panguitch Lake units are at management plan objective, where the Boulder Plateau, Mount Dutton, Pine Valley and Zion units are above objective.

Elk populations appear to be healthy and will continue to persist across the Forest as population numbers are up slightly from 2013.

### Interpretation.

**Is further evaluation needed?** Yes. Four mule deer populations, or management units within Dixie National Forest are currently above objective, and 2 units below and 1 unit at objective. Variation is determined over a three-year period with numbers generally being in a somewhat stable or upward trend with the exception of 2010. Since the decline in 2010 numbers have been increasing. Elk populations are generally above or at current objective population goals with all units at or above objective.

**What are the implications?** There are many factors influencing deer and elk populations, including weather, winter range conditions, calving and fawning conditions, forage, disease, predation, and hunting pressure/success. The elk and deer units on the Dixie National Forest extend beyond the boundaries of the Forest, particularly winter range. Therefore, conditions on lands other than those occurring on National Forest System administered lands influence these populations. Deer winter range conditions and areas available have been declining and are a major factor for declines of these deer herds. The UDWR is holding elk populations in check with accelerated antlerless hunting opportunities in certain units. This causes variable fluctuations in populations.



**Conclusion.** The Regional Advisory Council (RAC) makes recommendations to the Wildlife Board, who set season harvest numbers, and dates. Both the RAC and the Wildlife Board receive comments from the Forest Service and can accept or reject recommendations submitted through the RAC process. The Forest Service does not control population objectives or harvest limits.

Based on the data collected by the UDWR deer and elk populations are well distributed and are persistent across the forest.

#### **Monitoring Resources Available.**

UDWR conducts harvest and classification data, aerial reconnaissance, and models the population estimates.

#### **Recommendation.**

Continue monitoring the big game species in cooperation the UDWR; renew monitoring with pellet counts where appropriate in cooperation with UDWR.

#### **Citations**

Utah Division of Wildlife Resources (UDWR). 2015. Utah Big Game Annual Report. In Press. Heather Bernales.

## **B. Wild Turkey**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Wild Turkey	Annual UDWR harvest data, sighting records of reliable persons. Habitat evaluation during pre- and post-timber sale reviews and range analysis; annual reporting.	M/M	10% total decline in population size over a 3-year period and/or loss of important habitat components; i.e., roost trees in 2 or more areas of essential habitat as designated by UDWR and FS.

#### **Methods.**

UDWR harvest data, sightings from qualified persons, and habitat evaluations have been conducted. Habitat evaluations conducted were documented in wildlife specialist reports and through implementation, effectiveness, and validation monitoring efforts.

#### **Variation.**

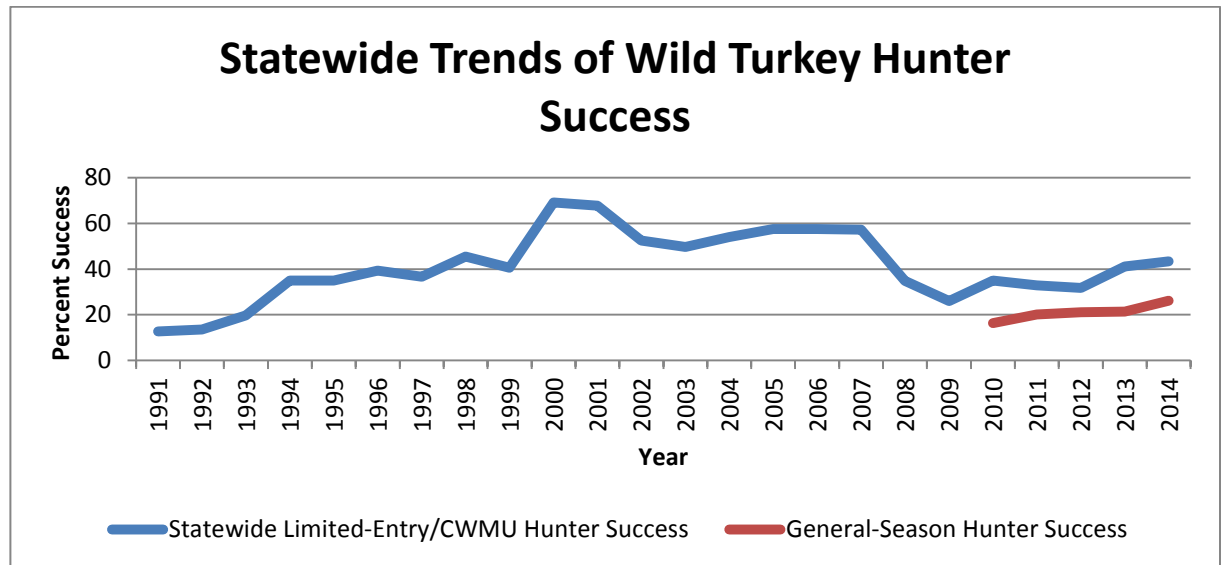
10% total decline in population size over a 3-year period and/or loss of important habitat components; i.e., roost trees in 2 or more areas of essential habitat as designated by UDWR and FS.

#### **Results.**

Utah's wild turkey populations are thriving and expanding across the state; they've grown to sufficient numbers for the Utah Wildlife Board to approve Utah's first statewide general-season turkey hunt starting in 2010 (UDWR 2009). The RAC process is used to make

population management recommendations, and the Utah Wildlife Board makes all decisions on population management.

Based on the data provided by the UDWR (UDWR 2014), turkey hunter success in Utah has increased in recent years. The chart below shows this increase, which also reflects an increase in bird populations Statewide, including the Southern Region and lands administered by the Dixie NF.



\*2002–2004 limited entry data does not include conservation permit information.

\*\*2005 limited entry data does not include conservation permit or landowner permit information

\*\*\*General season statewide permits were issued starting in 2010.

Based on hunter success information, turkey populations are in an upward trend despite decreased road access due to implementation of a motorized travel plan decisions. Therefore, populations are persistent in the Southern Region, including lands administered by the Dixie NF.

Incidental sightings are recorded inconsistently across the Forest and habitat evaluation occurs within project-specific analyses.

### Interpretation.

**Is further evaluation needed?** Wild turkeys have not declined more than 10% over a three-year period. There is limited data regarding important habitat components across the landscape for turkeys with the exceptions of old growth distribution maps and site specific maps for vegetation management projects. In addition, harvest statistics remain good in the Southern part of the state, so additional data collection is not necessary beyond that which is already being collected such as the old growth data and project specific habitat information on suitable turkey habitat.

**What are the implications?** The duration and intensity of winter conditions and predators have a much larger impact on turkey populations than management activities on the Dixie National Forest. Turkeys are habitat generalists and therefore may not reflect changes in the landscape that indicate whether we are moving toward desired conditions. Beyond maintaining large trees for roosting and adequate nesting habitat including ground cover,

turkeys require no specific management prescriptions. Maintaining these habitat features is built into existing plan direction for species such as big game and Northern goshawk, no further management prescriptions are needed beyond what is currently in the plan.

**Conclusion.** Wild turkey population fluctuations do not reflect management activities and turkeys are still on an upward trend in Southern Utah and Statewide.

### **Monitoring Resources Available.**

UDWR gathers and compiles the data for wild turkey population numbers and hunter success statewide. The Dixie National Forest records incidental turkey observations and manages roost tree habitat through implementation of the Forest Plan direction for old growth and Northern goshawk habitat management guidance for VSS distribution.

### **Recommendation.**

Consider dropping wild turkey as a Management Indicator Species with a Forest Plan amendment. Otherwise, continue to work with the UDWR to gather and compile data for wild turkey.

### **Citations**

Utah Division of Wildlife Resources (UDWR). 2012-2014. Utah Upland Game Annual Report. Pub. No. 12-25.

\_\_\_\_\_. 2009. 2010 Utah Turkey Guidebook. Accessed 12-8-2009; available from [http://wildlife.utah.gov/guidebooks/2010\\_turkey/2010\\_turkey\\_high.pdf](http://wildlife.utah.gov/guidebooks/2010_turkey/2010_turkey_high.pdf)

## **C. Northern Goshawk**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Goshawk	Nest survey for goshawk. Variable strip transect for goshawk annually if population near minimum level, or every 2-5 years in project areas; annual reporting.	M/M	10% total declining goshawk population size over a 3-year period.
Are known goshawk territories on national forests remaining occupied? <sup>5</sup>	Annual goshawk territory occupancy at the Forest level; reporting every 3 years.	NA	More than 20% decline in territory occupancy over a 3-year period.

### **Methods.**

Goshawk nest surveys and territory occupancy monitoring are conducted across the Forest. These methods, while very time-consuming, have been implemented and are effective at determining territory occupancy across the Forest.

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<sup>5</sup> Utah Northern Goshawk Project Decision Notice 2000, including a Forest Plan Amendment.

## Variation.

Population data are inferred from the number of active nests and occupied territories in relation to the number of known territories monitored.

Less than 20% declines in territory occupancy over a 3-year period is specified in the Utah Northern Goshawk Amendment as an acceptable range. The Forest Plan states 10% total declining goshawk population size over a 3-year period is a variation causing further evaluation.

Monitoring required in the Forest Plan and in the Goshawk Amendment are essentially the same and are therefore reported and evaluated here together.

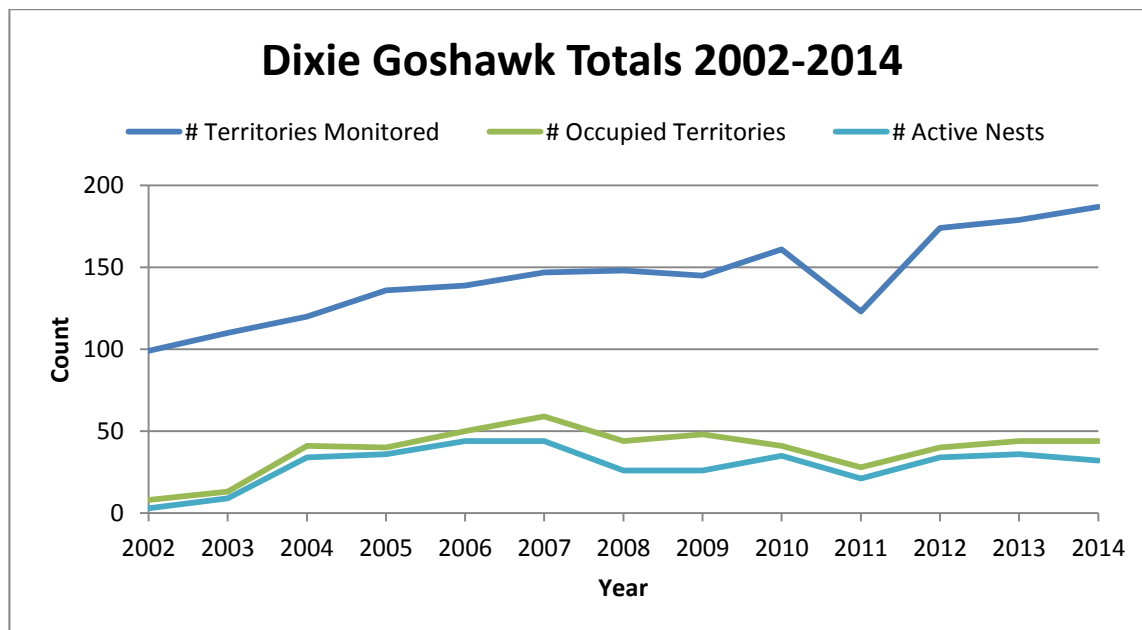
## Results.

Out of 191 existing goshawk territories on the Dixie National Forest, 187 were monitored in 2014. The following table displays goshawk monitoring results for the previous nine years. The increase in territories monitored is due to the discovery of new territories and the ability to get to more territories during this monitoring season. Additional territories were very likely occupied, but the absence of bird detections during the site visit prevented categorizing them as such.

**Summary Results of Northern Goshawk Monitoring on the Dixie National Forest, 2006-2014**

Northern Goshawk Monitoring Results									
Status	2006	2007	2008	2009	2010	2011	2012	2013	2014
Territories Monitored	138	148	149	144	161	120	176	181	187
Occupied Territories	50	59	44	47	42	28	42	47	42
Active Nests	44	44	26	26	35	21	34	35	32

The chart below shows monitoring results for the Dixie NF from 2002-2014.



## Interpretation.

**Is further evaluation needed?** No, the current year has demonstrated an increase in active nests and territory occupancy on the Dixie National Forest.

**What are the implications?** Goshawk populations on the Dixie National Forest fluctuate within reproductive seasons, and from season to season. They are affected by a number of factors such as drought, cold and wet early spring conditions, low prey densities, significant wind events, fire, modified vegetation in the landscape, and predators. For instance, the 2012 season demonstrated an increase in occupied territories from the 2011 season. The number of occupied territories in the 2012 season is the same as it was two years ago in 2010. In 2014 the number of active territories was similar to previous years; however, the number of occupied territories was the lowest over the past 9 year history displayed. Population persistence is a combination many factors but for this discussion active territories.

**Conclusion.** Although overall numbers fluctuate, the number of occupied goshawk territories across the Forest is high (greater than 40 pairs) and well-distributed among Ranger Districts with suitable habitat. These results indicate that our present method of managing the habitat is adequate to sustain persistent well distributed populations of goshawks across the Forest.

## Monitoring Resources Available.

Funding is provided to monitor territory occupancy each year. Territories are also prioritized according to likelihood of occupancy, and all high-priority territories were monitored in 2014. Funding for project-specific survey work is also available.

## Recommendation.

Because the northern goshawk is a Region 4 Sensitive Species, and a management indicator species (MIS) it is recommended to continue to monitor goshawk territories for occupancy and nesting activity. This item in the Forest Plan has been updated with the Utah Northern Goshawk Project Amendment.

## D. Northern (Common) Flicker

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Common [Northern] Flicker	Variable strip transect, sighting records of reliable persons, annually if population near minimum level, or every 2-5 years in project areas; annual reporting.	L/M	25% decline in population size over a 5-year period

## Methods.

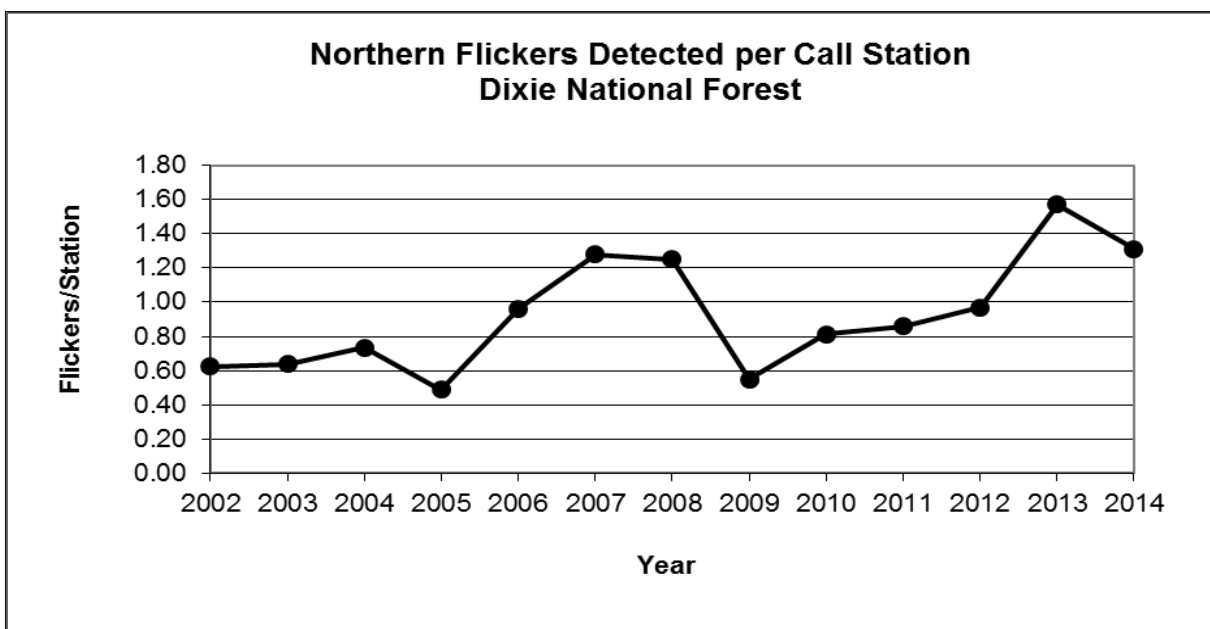
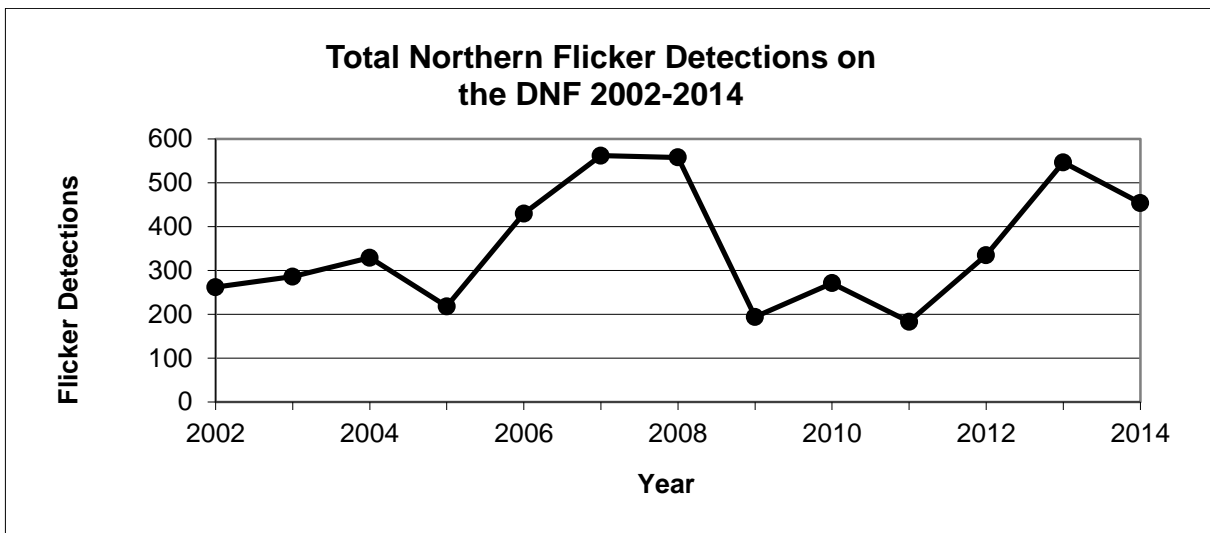
All five Ranger Districts were monitored in 2014 for northern flicker.

## Variation.

The variation causing further evaluation for northern flickers is a 25% decline in population size over a 5-year period.

## Results.

The chart below shows northern flicker detections per call station from 2002-2014 on the Dixie NF.



A total of 454 flickers were detected in surveys of 348 call stations, resulting in a detection rate of 1.31 flickers per station in 2014. Detection rate was lowest in 2005 and highest in 2013. In 2009, 18 flicker calling transects were removed from monitoring to prevent overlap with neighboring calling transects. This event accounts for the sharp decrease in count during the 2009 monitoring season. However, since 2009 flicker occupancy has steadily increased Forest-wide, with a small decrease of 93 birds or .26 birds per calling station in 2014. The variation in detection rates is likely due to changes in precipitation, insect populations, and weather conditions during the monitoring period.

## Interpretation.

**Is further evaluation needed?** No. Forest data collected in 2014 continues to indicate stable numbers of flickers across the Forest.

**What are the implications?** This species is well-distributed, occurring on each Ranger District over a variety of habitat types, and elevational ranges. Protective measures exist under the snag and downed woody debris standards and guidelines of the Forest Plan. These measures are implemented Forest-wide, and are effective in managing and protecting important habitats for cavity nesters, including flickers.

**Conclusion.** Northern flicker populations appear to be viable across the Dixie National Forest and in Utah.

## Monitoring Resources Available.

Funding is available for monitoring each year.

## Recommendation.

Continue to monitor Common [Northern] Flicker populations on the Forest in the established transects.

## E. Native cutthroat trout: Bonneville/Colorado River

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Native cutthroat trout: Bonneville, Colorado River	Accepted methods, such as gill netting, electro-shocking, or creel census, in coordination with UDWR when possible. 7-year revisit interval with annual reporting.	M/H	20% decline in occupied habitat of any single population over a 7-year period or a major change in size or quality of catch.
Compliance with State Water Quality Standards	Baseline monitoring described in Dixie Water Quality Monitoring Plan	M/M	Violation of State of Utah Water Quality Standards
Fish/Riparian habitat	Vegetative composition and age class surveys, Dixie water quality monitoring plan, aquatic MIS habitat surveys per MIS monitoring.	H/H	20% variation from specifications of Standards and Guidelines

## Methods.

UDWR is the agency with primary responsibility for monitoring core and conservation populations of Bonneville cutthroat trout (BCT) and Colorado River cutthroat trout (CRCT) in southern Utah; however, Forest personnel cooperate and assist with sampling. Sampling in streams consists of multiple pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, measured for total length and weighed. Density, standing crop and condition factor are calculated. Sampling in lakes consists of gill netting efforts. Fish are collected, enumerated, measured for total length and weighed. Catch rate and

condition factor are calculated. Results for sport fishing populations of BCT and CRCT are reported with MIS nonnative trout.

Water temperature was monitored with Stowaway Tidbit Temp Loggers (Onset Computer Corporation). Loggers were placed inside steel pipes with holes drilled in them and attached to rocks or roots with steel cables. Loggers recorded temperature every 15 minutes.

Bank alteration, stream bank stability, bank cover and greenline to greenline width were measured using the Multiple Indicator Monitoring methodology (Burton, Smith, & Cowley, 2011).

### **Variation.**

The variation that would cause further evaluation and/or change in management direction for CRCT is a 20% total decline in occupied habitat over a seven-year period or a major change in size or quality of catch.

The variation that would cause further evaluation and/or change in management direction for water temperature is a violation of Utah Water Quality standards.

The variation which would cause further change in bank stability and bank cover is a 20% variation from specifications of Standards and Guidelines.

### **Results.**

UDWR and Forest personnel cooperated to complete official trend monitoring on all stream core and conservation populations of CRCT in 2013 (Hadley, Golden, & Whelan, 2014). Overall this sampling effort showed that occupied habitat for CRCT and CRCT standing crop are stable to increasing for all populations on the DNF (Dixie National Forest, 2014). Trend monitoring will be completed again in, or before, 2019.

Part of the license renewal for Garkane's Boulder Hydroplant requires them to conduct annual fish monitoring to determine the effectiveness of other relicensing conditions at improving populations of CRCT in East Fork Boulder Creek. Garkane's contractor has completed this monitoring and reported on it annually since 2008 (Williams, 2014). The 2014 results showed brook trout density and standing crop in the East Fork Boulder Creek upstream from King's Pasture Reservoir was stable at a level lower than most historical sampling results prior to nonnative trout removal in 2009, but not unprecedented. Complete removal of nonnative trout from this area has been on hold since 2009 because of public opposition to the use of rotenone. The West Fork Boulder Creek was treated to remove brook trout and restore CRCT between the West Fork Reservoir and the East Fork Boulder Creek confluence in 2000-2001. Standing crop of CRCT at the lower end of this restored reach declined by nearly 40% between 2013 and 2014; however, size and condition factor remained similar to past years. The station above the West Fork Reservoir has shown high variability in terms of CRCT standing crop since 2006 (Williams, 2014). This station showed a large increase in CRCT standing crop in 2012, which adjusted slightly downward in 2013 and remained stable in 2014.

Currently the State of Utah lists all current CRCT habitat as Class 3A water, meaning they are "Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain." The State of Utah lists 20.0°C as the maximum temperature to meet the beneficial use of Class 3A waters. Water temperature was



monitored continuously at 10 locations in eight streams that have core/conservation populations of CRCT or are suspected migration corridors. Summer temperatures in Birch Creek (Main Canyon), Hall Creek, the downstream site on Water Canyon, and the downstream location on Pine Creek (Fremont River) all had maximums that exceeded 20.0°C in one, or more years between 2010-2014 (Table 1). Despite exceeding the State of Utah criteria for meeting the beneficial use of Class 3A waters the overall average temperatures and summer average temperatures measured in CRCT streams appeared to be well within the range for trout growth and survival (Table 2). A recent study found the critical thermal maxima for CRCT varied from 24.6°C to 29.4°C at acclimation temperatures between 10.0°C and 20.0°C (Underwood, Myrick, & Rogers, 2012). Summer maximum temperatures in Birch Creek during 2013 and 2014 and Hall Creek during 2014 were at or near this range; however, average summer temperatures suggest that acclimation temperatures in these streams was around 15°C. CRCT acclimated to temperatures of 15°C had a critical thermal maxima of 26.9°C (Underwood, Myrick, & Rogers, 2012).

**Table 1.** Location, year, dates of deployment, average temperature for dates of deployment, maximum temperature for dates of deployment, summer (June-September) average temperature, summer maximum temperature and summer maximum diel fluctuation for temperature probes deployed in CRCT habitat. All temperatures are in degrees Celsius.

Stream	Year	Dates deployed	Average	Maximum	Summer average	Summer maximum	Summer diel fluctuation
Birch Creek (Main Canyon)	2011	5/26/2011-12/31/2011	7.5	16.3	11.2	15.4	10.7
	2012	1/1/2012-12/31/2012	7.1	23.7	14.2	23.7	12.9
	2013	1/1/2013-9/30/2013	8.5	24.4	14.4	24.4	14.0
	2014	1/1/2013-9/30/2014	8.7	24.1	14.1	24.1	13.0
Hall Creek	2011	5/26/2011-12/31/2011	7.1	17.8	10.9	17.8	8.4
	2012	1/1/2012-12/31/2012	7.7	20.8	13.3	20.8	10.5
	2013	1/1/2013-7/30/2013 10/8/2013-12/31/2013 <sup>a</sup>	5.0	25.9	15.3	25.9	15.1
	2014	1/1/2014-9/30/2014	7.8	22.4	13.4	22.4	12.2
Water Canyon downstream	2011	1/1/2011-12/31/2011	4.8	15.6	9.8	15.6	7.5
	2012	1/1/2012-12/31/2012	5.8	22.7	11.9	22.7	12.5
	2013	1/1/2013-12/31/2013	5.1	18.7	11.5	18.7	9.6
	2014	1/1/2014-3/17/2014 <sup>b</sup> 7/22/2014-	5.6	20.3	11.9	20.3	9.6

Stream	Year	Dates deployed	Average	Maximum	Summer average	Summer maximum	Summer diel fluctuation
		9/30/2014 <sup>b</sup>					
Water Canyon upstream	2011	1/1/2011-12/31/2011	4.5	14.0	9.1	14.0	6.6
	2012	1/1/2012-12/31/2012 <sup>c</sup>	5.3	16.3	10.8	16.3	7.8
	2013	1/1/2013-12/31/2013	5.0	16.3	10.6	16.3	7.8
	2014	1/1/2014-9/30/2014	6.4	18.8	10.9	18.8	10.2
Twitchell Creek	2011	1/1/2011-12/31/2011 <sup>b</sup>	4.6	14.7	9.6	14.7	6.7
	2012	1/1/2012-12/31/2012	5.2	16.4	10.5	16.4	8.1
	2013	1/1/2013-12/31/2013 <sup>c</sup>	5.0	17.0	10.7	17.0	9.5
	2014	1/1/2014-9/30/2014	5.9	16.0	10.2	16.0	7.7
White Creek	2011	1/1/2011-12/31/2011	4.3	15.2	9.0	15.2	6.6
	2012	1/1/2012-12/31/2012	5.3	16.7	11.2	16.7	9.1
	2013	1/1/2013-5/28/2013 10/24/2013-12/31/2013 <sup>d</sup>	1.9	12.3	na	na	na
	2014	1/1/2014-9/30/2014	5.6	14.9	9.9	14.9	6.8
Pine Creek (Escalante)	2011	1/1/2011-12/31/2011	4.8	16.2	9.9	16.2	8.4
	2012	1/1/2012-12/31/2012	5.7	17.8	11.4	17.8	9.8
	2013	1/1/2013-12/31/2013	5.4	18.9	11.6	18.9	9.4
	2014	1/1/2014-10/14/2014	6.6	19.3	11.3	19.3	11.9
West Branch Pine Creek	2011	1/1/2011-12/31/2011	4.5	13.6	9.0	13.6	7.4
	2012	1/1/2012-10/3/2012 <sup>d</sup>	6.1	15.5	9.8	15.5	8.1
	2013	5/21/2013-12/31/2013 <sup>d</sup>	6.6	16.1	10.0	16.1	7.8
	2014	1/1/2014-10/14/2014	5.9	16.7	10.0	16.7	9.9
Pine Creek (Fremont) downstream	2011	1/1/2011-12/31/2011	6.0	20.3	11.6	20.3	11.4
	2012	1/1/2012-12/31/2012	6.7	21.1	12.3	21.1	12.4

Stream	Year	Dates deployed	Average	Maximum	Summer average	Summer maximum	Summer diel fluctuation
	2013	1/1/2013-12/31/2013	6.4	21.5	12.5	21.5	13.6
	2014	1/1/2014-8/4/2014	6.6	17.7	13.2	17.7	5.5
Pine Creek (Fremont) upstream	2011	1/1/2011-12/31/2011	5.7	14.4	8.8	14.4	4.9
	2012	1/1/2012-12/31/2012	6.1	14.7	9.6	14.7	4.6
	2013	1/1/2013-12/31/2013	6.0	14.7	10.0	14.7	4.9
	2014	1/1/2014-8/4/2014	6.4	15.0	10.8	15.0	4.1

<sup>a</sup> Probe dewatered by culvert replacement project. <sup>b</sup> Probe failure no data from 3/18/2014 through 7/21/2014. <sup>c</sup> Probe on partially submerged upon autumn retrieval. <sup>d</sup> Probe line snapped resulting in missing data.

In 2014 bank alteration, bank stability, bank cover and greenline to greenline width were measured along four streams that contain core or conservation populations of CRCT East Fork Boulder Creek headwaters and two locations on the West Fork Boulder Creek had covered and relatively stable banks (Table 2). While Forest Plan guidance is to maintain 50% stable banks, more current science suggests that a considerably higher level (up to 80 percent) may be needed in order to maintain appropriate channel configuration for the valley setting (Overton, McIntyre, Armstrong, Whitwel, & Duncan, 1995; Leffert, 2005). Data was collected before livestock were supposed to be turned out onto these locations; however, bank alteration from livestock was noted at two of the three locations.

**Table 2.** Stream, UTM location, date of sampling effort, percent bank alteration, percent bank stability, percent bank cover and greenline to greenline width (GGW) as measured by Multiple Indicator Monitoring protocol in CRCT habitat (Burton, Smith, & Cowley, 2011). Timing is relative to the Season of Use for the pasture containing each site as listed in the 2014 Annual Operating Instructions for the allotment.

Stream	Northing	Easting	Date	Bank alteration	Bank stability	Bank Cover	GGW (m)	Timing
East Fork Boulder Creek (Headwaters – 3031)	4214552	459464	6/24/2014	13%	86%	99%	6.6	Before
West Fork Boulder Creek (Lower – 1317)	4209750	457478	6/25/2014	3%	98%	99%	2.4	Before
West Fork Boulder Creek (9072)	4211626	457053	6/25/2014	17%	85%	98%	2.0	Before

UDWR and Forest personnel last completed cooperative sampling efforts on all known core and conservation stream populations of BCT from 2008-2010 (Hadley, Ottenbacher, Golden, & Whelan, 2010; Hadley, Ottenbacher, & Golden, 2011). From the results of these surveys

Forest personnel estimated that occupied habitat for Forest BCT core and conservation populations had declined by approximately 35% compared to the maximum known occupied habitat and average standing crop across these populations had declined by over 50% (Dixie National Forest, 2011). The Forest identified impacts from the 2002 Sanford and Sequoia fires as the primary reason for the loss of both occupied habitat and standing crop and is currently working on fire management recommendations in native cutthroat watersheds (Dixie National Forest, 2011).

In 2012 UDWR employees collected fin clips from cutthroat trout observed in Mammoth Creek upstream from Mammoth Springs. Genetic evaluation of these fin clips identified that they were 98% BCT with 2% introgression from Yellowstone cutthroat trout (Evans, Houstin, Oh, & Shiozawa, 2013). DNF personnel found cutthroat trout in Reed Valley Creek, a tributary to Mammoth Creek, in 2012 (Golden M. , 2013). In 2013 and 2014 UDWR and DNF personnel coordinated in an effort to obtain 30 fin clips from cutthroat trout for analysis. These fin clips were analyzed twice and appear to be from the Strawberry Reservoir cutthroat strain and not native to the Mammoth Creek drainage (Evans & Shiozawa, 2014). Qualitative sampling throughout the Mammoth Creek drainage suggests that BCT are present from somewhere downstream of the Mammoth Creek subdivision, upstream to the Meadow Lakes subdivision; however this is based on the collection of single individuals in the unnamed tributary flowing out of the Meadows Lakes subdivision and in Mammoth Creek below the Red Desert Road (FSR 30240). The BCT population in Mammoth Creek really seems centered in approximately 5 miles of stream from just upstream of Castle Valley Creek downstream the Mammoth Creek subdivision.

UDWR and Forest personnel cooperatively established a quantitative monitoring station on Mammoth Creek within the 5 mile section where BCT have a stronghold (Table 3). The station was established approximately 0.9 miles downstream from the Castle Valley Creek confluence. BCT, brook trout and one BCT X rainbow trout hybrid were collected at the station. The combined standing crop for all trout would be considered average when compared to other southern Utah trout streams (Hepworth & Beckstrom, 2004).

In FY2014 Forest and UDWR personnel repeated quantitative monitoring for BCT populations in Threemile Creek and its tributaries, Delong Creek and Indian Creek. After nearly uniform declines in standing crop between 2003 and 2008, the 2014 data showed nearly uniform increases in BCT standing crop throughout the Threemile Creek drainage. Stations in Delong Creek and Indian Hollow all showed an equal or higher standing crop than seen in previous sampling efforts during 2003 and 2008. While the middle station in Threemile Creek (Station #2) showed similar results, the upstream (Station #3) and downstream (Station #1) stations showed improved standing crop over 2008 but remained depressed when compared to sampling in 2003.

Two streams with core or conservation populations of BCT had continuous temperature monitoring conducted in 2014: West Hunt Creek and Cottonwood Creek. All occupied BCT habitat on the Forest is classified as a Class 3A stream by the State of Utah with a maximum temperature criteria of 20.0°C to meet the beneficial use for cold water aquatic life. BCT from the Manning Meadow brood stock were introduced into West Hunt Creek in 2007 and BCT from the Ranch Creek population were introduced into Cottonwood Creek in 2013. Temperature monitoring in both Cottonwood and West Hunt Creeks since 2011 has shown

that summer maximum temperatures and diel fluctuations are high in these streams (Table 4). Summer maximums have exceeded State Water Quality standards every year.

The laboratory derived critical thermal maxima for BCT is 24.2°C (Johnstone & Rahel, 2003). This maximum was exceeded in both 2012 and 2014 in Cottonwood Creek and from 2012-2014 in West Hunt Creek. Other investigators have found that cutthroat trout can survive higher temperatures in the wild than those that appear lethal in the laboratory, partially because diel temperature fluctuations and acclimation temperatures can moderate the influence of maximum temperatures (Wagner, Arndt, & Brough, 2001; Schrank, Rahel, & Johnstone, 2003; Dunham, Schroeter, & Rieman, 2003). One study showed that BCT acclimated at 18.0°C -20.0°C had a critical thermal maximum as high as 29.5°C (Wagner, Arndt, & Brough, 2001). This maximum was matched in West Hunt Creek in 2013. Diel temperature fluctuations in West Hunt Creek were also very high and were greater than 10.0°C for most of the summer from 2012-2014. While diel temperature fluctuation may shield cutthroat trout from the lethal effects of high maximum temperatures, higher and more variable thermal regimes have been shown to negatively affect growth of cutthroat trout (Dickerson & Vinyard, 1999; Johnstone & Rahel, 2003; Meeuwig, Dunham, Hayes, & Vinyard, 2004).

**Table 3.** Name, year sampled, species collected, average total length (range in parentheses), condition (K) factor, density (#/ha or #/mile; 95% confidence interval in parentheses), standing crop (kg/ha; 95% confidence interval in parentheses), and percent (%) change in standing crop between most recent sampling years for stations sampled in BCT habitat in 2014.

Sample site	Year	Species	Average total length (mm)	K factor	Density (#/ha)	Standing Crop (kg/ha)	Percent change in standing crop
Delong Creek - Station #1	2014	BCT	196 (145-235)	0.965	2,943 (2,846-3,000)	188 (162-216)	119
	2008	BCT	153	0.99	2,269	86	-40
	2003	BCT	152	na	2,800	143	na
Delong Creek - Station #2	2014	BCT	144 (100-209)	0.889	2,875 (2,750-3,000)	89 (61-118)	536
	2008	BCT	121	1.08	714	14	na
Indian Hollow	2014	BCT	190 (159-223)	0.991	1,634	113 (88-138)	495
	2008	BCT	186	1.08	253	19	71

Sample site	Year	Species	Average total length (mm)	K factor	Density (#/ha)	Standing Crop (kg/ha)	Percent change in standing crop
	2003	BCT	182	na	833	66	na
Mammoth Creek #1	2014	BCT	160 (75-283)	0.912	788 (712-865)	41 (25-58)	na
		BCT X rainbow trout hybrid	220	1.071	19	3	na
		Brook trout	161 (93-212)	1.215	577 (558-596)	27 (22-33)	na
Threemile Creek-Station #1	2014	BCT	240	0.883	75	9	Increase
		Southern leatherside	86 (53-106)	na	1,507 (1,356-1,657)	10 (8-12)	-29
		Mountain sucker	110 (102-119)	na	226	3	na
		Speckled dace	66 (43-81)	na	4,821 (3,164-6,478)	13 (8-18)	na
	2008	BCT	na	na	0	0	-100
		Southern leatherside	na	na	1,375 (1,292-1,458)	14 (11-16)	na
		Mountain sucker	na	na	1,000 (917-1,083)	27 (22-33)	na
		Speckled dace	na	na	375 (333-417)	1	na
	2003	BCT	221	na	231	24	na
		Southern leatherside	na	na	Present	na	na
		Mountain sucker	na	na	Present	na	na
		Speckled dace	na	na	Present	na	na
Threemile Creek-Station #2	2014	BCT	194 (133-252)	1.085	917 (845-988)	78 (50-110)	-5
	2008	BCT	173	1.01	1,473 (1,473-1,550)	82 (82-86)	143
	2003	BCT	166	na	667	35	na

Sample site	Year	Species	Average total length (mm)	K factor	Density (#/ha)	Standing Crop (kg/ha)	Percent change in standing crop
Threemile Creek-Station #3	2014	BCT	170 (153-196)	1.17	667	39 (25-53)	34
	2008	BCT	166	0.97	645	29	-62
	2003	BCT	152	na	1,900	76	na

**Table 4.** Location, year, dates of deployment, average temperature for dates of deployment, maximum temperature for dates of deployment, summer (June-September) average temperature, summer maximum temperature and summer maximum diel fluctuation for temperature probes deployed in BCT habitat. All temperatures are in degrees Celsius.

Stream	Year	Dates deployed	Average	Maximum	Summer average	Summer maximum	Summer diel fluctuation
Cottonwood Creek	2011	6/7/2011-12/31/2011	8.8	23.7	13.7	23.7	15.4
	2012	1/1/2012-12/31/2012 <sup>a</sup>	6.8	25.1	13.3	25.1	15.8
	2013	1/1/2013-12/31/2013	6.3	23.2	13.0	23.2	15.3
	2014	1/1/2014-11/13/2014	7.8	26.9	13.8	26.9	17.2
West Hunt Creek	2011	6/13/2011-12/31/2011	8.2	23.2	12.6	23.2	16.8
	2012	1/1/2012-12/31/2012	6.9	27.7	14.5	27.8	20.9
	2013	1/1/2013-12/31/2013	6.5	29.6	14.4	29.6	21.1
	2014	1/1/2014-	7.8	28.6	14.3	28.6	20.7

<sup>a</sup> Probe was washed up on the bank when retrieved on October 26, 2012, but the temperature record did not provide a clear picture of what event put the probe out of water so all data collected between May 21-October 26, 2012 are suspect.

Bank alteration, stability and cover information were collected on Reservoir and Water Canyons, which contain remnant, core populations of BCT, as well as on Little Creek, Indian Hollow and Threemile Creek which contain restored, conservation populations of BCT (Table 5). Reservoir Canyon had relatively high bank stability and cover along with little bank alteration. Reservoir Canyon sits in a valley that is difficult for livestock to access because of steep terrain and an abundance of dead and downed woody debris. Water Canyon had relatively high bank stability and cover; however, bank alteration exceeded the Annual Use Criteria of 20% at this location before the season of use specified by the 2014 Annual Operating Instructions.

The Mortensen Canyon site on Little Creek had relatively high bank stability while the Upper Little Creek site had moderate to low bank stability. While Forest Plan guidance is to maintain 50% stable banks, more current science suggests that a considerably higher level (up to 80 percent) may be needed in order to maintain appropriate channel configuration for the valley setting (Overton, McIntyre, Armstrong, Whitwel, & Duncan, 1995; Leffert, 2005). Similar to Water Canyon the bank alteration Annual Use Criteria was being approached at the Upper Little Creek site prior to the season of use specified in the 2014 Annual Operating Instructions. A return visit eight days into the season of use for the pasture containing this site found that the bank alteration was 40%, which exceeds the 20% annual use criterion outlined in the 2014 Annual Operating Instructions.

Indian Hollow and Threemile Creek were assessed with the full Multiple Indicator Monitoring protocol in September 2014 as part of an Implementation Training for this protocol by the Utah Riparian Service Team. Additionally Indian Hollow was assessed for bank alteration, stability and cover earlier in the summer. Bank alteration was not assessed at Threemile Creek because recent flooding has impacted the location of the greenline. Bank stability was moderate on Threemile Creek. Bank stability readings varied widely between the two readings on Indian Hollow. Interestingly the amount of measured bank alteration varied by a similar margin and was inversely related to the bank stability information. Bank alteration exceeded the 20% annual use criterion outlined in the 2014 Annual Operating Instructions during both visits; however, the bank showed signs of healing following the season of use for the pasture.

**Table 5.** Stream, UTM location, date of sampling effort, percent bank alteration, percent bank stability, percent bank cover and greenline to greenline width (GGW) as measured by Multiple Indicator Monitoring protocol in CRCT habitat (Burton, Smith, & Cowley, 2011). Timing is relative to the Season of Use for the pasture containing each site as listed in the 2014 Annual Operating Instructions for the allotment.

Stream	Easting	Northing	Date	Bank alteration	Bank stability	Bank Cover	GGW (m)	Timing
Indian Hollow (9028) <sup>a</sup>	362382	4190420	7/23/2014	54%	68%	96%	1.6	During



			9/17/2014	36%	88%	95%	1.1	After
Reservoir Canyon (8056)	285857	4144671	8/27/2014	2%	93%	94%	2.3	During
Upper Little Creek (1349)	356056	4192726	7/3/2014	14%	62%	73%	2.8	Before
			9/11/2014	40%	na	na	na	During
Mortensen Canyon (Little Creek - 7047)	354567	4193237	5/28/2014	8%	93%	98%	1.5	Before
Threemile Creek (7044) <sup>a</sup>	367341	4192304	9/17/2014	na	77%	81%	2.2	Rested
Water Canyon (5022)	281174	4143622	6/30/2014	22%	88%	98%	1.8	Before

<sup>a</sup> September 17, 2014 data was collected during a Multiple Indicator Monitoring Implementation Training session. Large flooding had recently occurred on the Threemile Creek site, so short term indicators were not taken.

### Interpretation.

The Forest Plan states that the variation which would cause further evaluation and/or change in management direction for BCT and CRCT is a 20% decline in occupied habitat of any single population over a 7-year period or a major change in size or quality of catch. During 2013 and 2014 sampling efforts occupied habitat for CRCT was stable to increasing for all populations across the DNF (Hadley, Golden, & Whelan, 2014). In 2014 CRCT standing crop in the West Fork of Boulder Creek above the East Fork confluence showed a 40% decline in standing crop but no major change in the size or quality of catch. Standing crop would still be considered average when compared to other southern Utah trout streams (Hepworth & Beckstrom, 2004). Low flow years from 2012-2013 may have affected recruitment of CRCT at this station in one, or more, of those years. CRCT populations will be further evaluated during the next Lower Colorado Geographic Management Unit trend assessment sampling efforts during, or prior to, 2020.

The 2014 sampling efforts in Mammoth Creek were the first attempt to quantify the distribution and standing crop of the remnant, conservation population of BCT in this drainage. This initial sampling effort showed that BCT were distributed over

BCT populations will be further evaluated during upcoming sampling efforts from 2014-2018; however, distributional sampling in 2013 and 2014 indicated an increase in occupied habitat (Dixie National Forest, 2014).

The Forest Plan States the variation which would cause further evaluation and/or change in management direction for water temperature is a violation of State Water Quality Standards. State water quality standards were violated at one or more years between 2011-2014 in Birch Creek (Main Canyon), Cottonwood Creek, Hall Creek, Pine Creek (Fremont River), Water Canyon Creek and West Hunt Creek. Temperature monitoring should continue at these sites to document water temperature information over the flow regimes of different water years.

The Forest Plan States that the variation which would cause further evaluation and/or change in management direction for bank stability is a 20% variation from specifications of Standards and Guidelines. The Forest Plan standard for bank stability is 50% and the Forest Plan

standard for stream bank cover is 80% in Riparian Management Areas (9A). None of the bank stability measures collected in CRCT or BCT habitat were below 50%; however, more recent science would suggest that desired bank stability should be considerably higher (up to 80%) for most channel types (Overton, McIntyre, Armstrong, Whitwel, & Duncan, 1995; Leffert, 2005). Bank stability measured sites higher than 80% at all sites except the Indian Hollow, Threemile and Upper Little Creek. While no further evaluation is required according to the Forest Plan, more recent science would suggest that bank stability at the Upper Little Creek site, and possibly the Threemile and Indian Hollow sites, is not sufficient to maintain the desired channel configuration.

The Indian Hollow site was evaluated twice during the season and the estimate of bank stability varied by 20%. Since bank stability is meant to be a long-term indicator, such a high level of variability is not expected and should be evaluated.

The bank alteration annual use criterion was exceeded at two of three locations sampled during or after the season of use specified by the annual operating instructions. Additionally, bank alteration was exceeded in Water Canyon prior to the season of use shown in the 2014 Annual Operating Instructions. Three of five additional sites where bank alteration was measured prior to the season of use shown in the 2014 Annual Operating Instructions had evidence of livestock use and bank alteration between 10% and 20%.

Four of the sites evaluated in native cutthroat trout habitat are within a Riparian Management Area (9A): East Fork Boulder Creek, Indian Hollow, Threemile Creek and West Fork Boulder Creek. The Forest Plan standard for stream bank cover in Management Area 9A is 80%. Cover at these sites exceeded 80% so no further evaluation is needed.

### **What are the implications?**

Birch Creek, Hall Creek and the lower end of Water Canyon Creek all have naturally low flows and are at relatively low elevations (7,500 feet or less), which may contribute to the high temperatures documented in these streams. Birch Creek is at best marginal habitat for CRCT and has been speculated to be a migratory corridor and possibly a sink for CRCT from the Water Canyon Creek population. The high temperatures noted from 2011-2014 and low bank stability documented in 2013 are probable contributing factors to the lack of use by CRCT. Recent fish passage, road decommissioning/maintenance and riparian improvement projects in and around this stream may increase bank stability and cover and could possibly help lower temperatures.

CRCT standing crop is considerably lower in the downstream portions of Hall Creek and Water Canyon Creek than in the upper portions, which may be a function of the warmer temperatures moving away from the water sources of these streams. Similar to Birch Creek these streams have had recent fish passage, road decommissioning/maintenance and riparian improvement projects in and around them that may increase bank stability and cover and could possibly help lower temperatures.

The downstream temperature probe in Pine Creek (Fremont River) is located on the border of Forest Service and BLM land. It is also immediately downstream from a large enclosure, so there are multiple fence lines. Cattle are also gathered in this area before trailing of the Forest. The stream in this area is considerably wider than immediately upstream in the

enclosure and little overhanging vegetation exists, which may contribute to the maximum temperatures seen at this site.

The variability seen in the two bank stability measurements made at Indian Hollow appears to be a function of the amount of bank alteration present during the two visits. Bank alteration during the July visit was measured at over 50%, meaning over 50% of the linear distance of the stream bank was trampled sheared or sloughed (Figure 1). When the bank is this altered on a small stream sometimes multiple alteration can present as an instability feature, such as a bank fracture or slump as defined in the MIM protocol (Figure 2). If the alterations subsequently heal over with vegetation, they would not be classified as an instability feature.

The Indian Hollow (9028), Threemile Creek (7044) and Upper Little Creek (1349) sites all showed bank stabilities lower than 80%; however, the Indian Hollow (9028) site was sampled during and after the season of use and showed relatively high levels of bank alteration (54%/36%). As discussed above some of the instability noted at the Indian Hollow (9028) location may have been attributable to heavy bank alteration, especially during the July sampling effort. Riparian Level II Inventory data from 2014 suggested that the Indian Hollow (9028) location was meeting its vegetation objectives and on an upward trend from 2009 sampling.

The Threemile Creek (7044) location was listed as being rested in the 2014 Annual Operating Instructions; however, some livestock use was observed on this pasture during July 2014 fish sampling efforts. Sampling 2012 showed that this site was meeting riparian vegetation objectives and was on an upward trend in riparian vegetation from prior sampling in 2007.

The Upper Little Creek (1349) site was assessed prior to the season of use but already had livestock use and bank alteration was measured at 14%. This site is within an incision, is actively eroding in spots and appears to be having trouble reestablishing riparian vegetation within the incision (Figure 3). The Upper Little Creek (1349) site was not meeting its vegetation objectives in 2013. Despite these obvious stream channel stability issues, bank stability still came out considerably higher than the Forest Plan objective of 50%, providing some additional local evidence that this objective may be too low.



**Figure 1.** Heavily trampled bank at the Indian Hollow MIM site in July 2014.





**Figure 2.** Example of an instability feature measured at the Indian Hollow MIM site in July that may have been Indian Hollow caused by 2014 bank alteration and healed over with vegetation by September 2014 sampling.





**Figure 3.** Incised channel with raw banks visible upstream at the Upper Little Creek (1349) location.

**Conclusion.** Monitoring activities in 2014 showed an expanded range and stable to improving populations for CRCT on the Forest. CRCT distribution is greater than previously thought because of a combination of previously unknown population distribution and expanding populations following renovation/reintroduction. Native fish restoration projects for CRCT continue to be successful at increasing occupied habitat and standing crop of CRCT on the Forest. Restoration and reintroduction of BCT also continues to be successful and will be reevaluated between 2014 and 2018. The fish monitoring required by the Garkane Boulder Hydroplant relicensing is providing a good long-term description of the fish community and its inherent variability in the Boulder Creek system. As additional requirements of the Hydroplant relicensing are implemented this data set will provide a good baseline to compare changes against.

The single 2009 rotenone treatment on East Fork Boulder Creek between the headwater meadow and King's Pasture Reservoir was unsuccessful at a complete removal of brook trout and the delay in completing the project is allowing brook trout to recover to near pre-treatment levels. Other restoration projects throughout the Escalante and Fremont River drainages continue to be successful.

While native cutthroat trout restoration and reintroduction activities have been successful at restoring remnant populations and reintroducing conservation populations, habitat monitoring shows that some native cutthroat streams may need additional habitat management in order to reach their full potential.

While the results of 2013 sampling indicated that measuring bank stability before and after livestock use showed a difference in the percentage of stable banks that was 10% or less, data from 2014 showed that this difference can be considerably larger. High levels and concentrations of bank alteration appear to be responsible for this discrepancy.

The bank alteration annual use criterion is the short-term indicator for bank stability. Consistent exceedance of this criterion may result in a downward trend in stream bank stability in some locations.

Unauthorized use prior to the timing specified in Annual Operating Instructions appears to be contributing the exceedance of the bank alteration annual use criteria in some pastures.

Visual observations of poor overall bank stability in areas with greater than 50% bank stability (e.g. Upper Little Creek – 1349) indicate that the 50% bank stability in the Forest Plan objective may be too low. This is supported by more current science than the Forest Plan (Overton, McIntyre, Armstrong, Whitwel, & Duncan, 1995; Leffert, 2005).

### **Monitoring Resources Available.**

Currently, BCT and CRCT monitoring on the Forest is accomplished by cooperation and coordination with UDWR. Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR. Temperature and habitat monitoring is completed entirely by Forest Service personnel. Without continued funding of a seasonal monitoring work force, the Forest will be unable to collect habitat monitoring data.

## **Recommendation.**

- Current CRCT distribution and abundance should be reassessed as part of the 7 year interval UDWR trend monitoring by 2020 or if any disturbance to CRCT habitat is identified.
- BCT distribution and abundance should continue to be assessed between 2015 and 2017 until all Southern GMU populations have been resampled.
- Continue to work with UDWR to accomplish BCT and CRCT monitoring objectives, while identifying potential population expansion opportunities for the two species.
- Begin planning projects to restore and replicate the Mammoth Creek BCT population.
- Continue to assess Birch Creek, Hall Creek and Water Canyon Creek Restoration work through fish, habitat and temperature monitoring.
- Management activities that encourage riparian vegetation growth and stream bank stability should be considered on Birch Creek, Cottonwood Creek, Hall Creek, Water Canyon Creek, Pine Creek (Fremont River) and West Hunt Creek.
- If bank stability as measured by the MIM protocol is to be used as a long-term indicator of bank stability, measurements should be made before livestock are turned out on that pasture.
- During the 2015 grazing season special attention should be given to the pastures containing sites that did not meet bank stability or bank cover objectives in 2014.
- Bank stability, cover and greenline to greenline width measurements should be retaken prior to season of use at the Indian Hollow (9028) site.
- Bank stability, cover and greenline to greenline width monitoring should be repeated in 3-5 years in order to develop trend data for these locations.
- Ensure adherence to the terms and conditions of the grazing permits and the Annual Operating Instructions for livestock allotments.
- Work to develop site specific bank stability and greenline to greenline width objectives in Allotment Management Plans.





**Figure 4. Bonneville cutthroat trout collected in Delong Creek during July 2014 sampling efforts.**

## F. Virgin spinedace

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Virgin spinedace	Accepted methods, such as electro-shocking, in coordination with UDWR when possible. 5-year revisit interval with 5 year reporting.	M/H	20% decline in occupied habitat Forest-wide in any 5-year period, or a major change in age class structure or reproductive success.
Fish/Riparian habitat	Vegetative composition and age class surveys, Dixie water quality monitoring plan, aquatic MIS habitat surveys per MIS monitoring	H/H	20% variation from specifications of Standards and Guidelines

### Methods.

The Forest and UDWR cooperatively monitor Virgin spinedace with multiple pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, and measured for total length and weighed. Density is calculated.

### Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% total decline in occupied habitat over a five-year period or in age class structure or reproductive success.

### Results.

No sampling activities were conducted in Virgin spinedace habitat in FY2014.

### Interpretation.

**Is further evaluation needed?** No

**What are the implications?** None

**Conclusion.** The quantitative Virgin spinedace monitoring station on Moody Wash will be resampled in FY 2015.

### Monitoring Resources Available.

Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant of data collected by UDWR.

Without continued funding of a seasonal monitoring work force, the Forest will be unable to collect habitat monitoring data.

### Recommendation.

- Work cooperatively with UDWR to repeat quantitative monitoring in FY2015.
- Work cooperatively with UDWR to improve habitat through nonnative salt cedar removal along Moody Wash.

- Work cooperatively with UDWR to identify potential areas to expand the distribution of Virgin spinedace on the Forest.

## G. Southern leatherside

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Southern leatherside	Accepted methods, such as electro-shocking, in coordination with UDWR when possible. 5-year revisit interval with 5 year reporting.	M/H	20% decline in occupied habitat Forest-wide in any 5-year period, or a major change in age class structure or reproductive success.
Compliance with State Water Quality Standards	Baseline monitoring described in Dixie Water Quality Monitoring Plan	M/M	Violation of State of Utah Water Quality Standards
Fish/Riparian habitat	Vegetative composition and age class surveys, Dixie water quality monitoring plan, aquatic MIS habitat surveys per MIS monitoring.	H/H	20% variation from specifications of Standards and Guidelines

### Methods.

The Forest and UDWR cooperatively monitor southern leatherside with multiple pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, and measured for total length and weighed. Density is calculated.

Water temperature was monitored with Stowaway Tidbit Temp Loggers (Onset Computer Corporation). Loggers were placed inside steel pipes with holes drilled in them and attached to rocks or roots with steel cables. Loggers recorded temperature every 15 minutes.

Bank alteration, stream bank stability, bank cover and greenline to greenline width are assessed using the Multiple Indicator Monitoring methodology (Burton, Smith, & Cowley, 2011).

### Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% total decline in occupied habitat over a seven-year period or a major change in size or quality of catch.

The variation that would cause further evaluation and/or change in management direction for water temperature is a violation of Utah Water Quality standards.

The variation which would cause further change in bank stability and bank cover is a 20% variation from specifications of Standards and Guidelines.

### Results.

Quantitative monitoring for conservation populations of southern leatherside occurred on two streams in 2014: Bear Creek and Threemile Creek. Threemile Creek station #1 is just upstream from the Forest boundary and has maintained southern leatherside in the past there

sampling efforts (2003, 2008, 2014; Table 3). While southern leatherside standing crop in 2014 declined by 28% from the 2008 sampling effort, density remained stable to slightly higher indicating that size/age distribution dynamics are probably responsible for any change in standing crop.

Conversely the 2014 sampling effort in Bear Creek upstream from the Forest boundary found no southern leathersides, while sampling efforts in 2006 and 2009 had found southern leathersides at this station (Table 6). Brown trout standing crop in 2014 was more than double that seen in 2009 and would be considered very high-exceptional when compared to other southern Utah trout streams (Hepworth & Beckstrom, 2004).

Cooperative sampling downstream on BLM lands found that southern leatherside density was lower in 2014 than in 2009, but that standing crop was higher. All three native minnow and sucker species found at the BLM station in 2009 were also found in 2014. No brown trout were collected in either year.

Qualitative sampling in FY 2013 found that southern leatherside were in a 1.5 mile section of Swain's Creek between a pond upstream from FSR33485 and a large head cut within an exclosure upstream from FSR32328 (Everett Hollow motorized trail) (Dixie National Forest, 2014). In 2014 a quantitative station was established near Kiln Hollow to begin trend data collection on this population of southern leatherside. Data showed a moderate number of adult southern leatherside with no evidence on 2014 reproduction. Brook trout standing crop at this station would be considered high to exceptional when compared to other southern Utah trout streams (Hepworth & Beckstrom, 2004).

**Table 6.** Name, year sampled, species collected, average total length (range in parentheses), condition (K) factor, density (#/ha or #/mile; 95% confidence interval in parentheses), standing crop (kg/ha; 95% confidence interval in parentheses), and percent (%) change in standing crop between most recent sampling years for station sampled in southern leatherside habitat in 2014.

Sample site	Year	Species	Average total length (mm)	K factor	Density (#/ha)	Standing Crop (kg/ha)	Percent change in standing crop
Bear Creek (Forest)	2014	Brown trout	221 (140-336)	0.877	2,588	283 (219-347)	114
		Southern leatherside	na	na	0	0	-100
		Mountain sucker	160	na	65	3	-63
		Speckled dace	56 (28-85)	na	7,764 (5,629-	14 (12-22)	na

Sample site	Year	Species	Average total length (mm)	K factor	Density (#/ha)	Standing Crop (kg/ha)	Percent change in standing crop
					9,900)		
	2009	Brown trout	211 (76-330)	1	1438	132 (91-173)	-48
		Southern leatherside	89 (30-126)	na	1,063 (750-1,375)	10 (4-18)	na
		Mountain sucker	129 (118-153)	na	375 (188-563)	8 (3-15)	na
		Speckled dace	62 (28-92)	na	9,750 (5,500-14,000)	na	na
	2006	Brown trout	228 (89-370)	0.961	1,690 (1,819-1,559)	248 (191-295)	na
		Southern leatherside	Present	na	na	na	na
		Mountain sucker	Present	na	na	na	na
		Speckled dace	Present	na	na	na	na
Bear Creek (BLM)	2014	Southern leatherside	69 (25-117)	na	7,771 (6,618-8,318)	27 (20-34)	50
		Speckled dace	53 (26-86)	na	18,458 (16,879-20,036)	31 (29-34)	na
		Mountain sucker	106 (58-140)	na	na	na	na
	2009	Southern leatherside	70 (24-132)	na	18,950 (18,493-19,406)	18 (15-22)	na
		Speckled dace	48 (19-91)	na	23,174(20,890-25,457)	na	na
		Mountain sucker	83 (60-120)	na	1,940 (1,826-2,055)	14 (7-21)	na
Swains Creek - Kiln Hollow	2014	Brook trout	94 (52-231)	0.919	12,093 (11,628-12,558)	266 (42-507)	na
		Southern leatherside	107 (75-135)	na	4,651	51 (23-74)	na

Sample site	Year	Species	Average total length (mm)	K factor	Density (#/ha)	Standing Crop (kg/ha)	Percent change in standing crop
		Redside shiner	82 (73-102)	na	8,372 (7,442-9302)	33 (21-44)	na
		Mountain sucker	98 (40-121)	na	9,767 (8,837-10,698)	110 (77-147)	na

Water temperature was monitored in one stream, West Hunt Creek, with a conservation population of southern leatherside. Temperature information for West Hunt Creek is discussed under the native cutthroat trout section.

Bank stability was moderate on the Bear Creek sites, as well as the East Fork Sevier River site and Threemile Creek (Table 7). Bear Creek 7045 is upstream of occupied fish habitat while bear creek (A-4 is within the 1.6 miles of stream known to have contained southern leatherside prior to 2014. Bank cover was moderate at all four stations. Bank alteration exceeded the Forest Plan standard of 20% at the Bear Creek 7045 station despite being measured prior to the season of use identified in the 2014 Annual Operating Instructions for that pasture.

**Table 7.** Stream, UTM location, date of sampling effort, percent bank alteration, percent bank stability, percent bank cover and greenline to greenline width (GGW) was measured by Multiple Indicator Monitoring on streams in or immediately upstream from southern leatherside habitat (Burton, Smith, & Cowley, 2011).

Stream	Easting	Northing	Date	Bank alteration	Bank stability	Bank cover	GGW (m)	Timing
Bear Creek (7045 - Sevier River)	361501	4201816	5/28/2014	26%	74%	79%	2.0	Before
Bear Creek (A-4) <sup>a</sup>	362659	4202612	9/17/2014	17%	82%	82%	2.0	After
East Fork Sevier River 7052 – Mill Hollow Confluence	390117	4164663	5/20/2014	2%	72%	76%	5.1	Before
East Fork Sevier River 7052 – Mill Hollow Confluence	390117	4164663	9/9/2014	2%	na	na	na	Before
Threemile Creek (7044) <sup>a</sup>	367341	4192304	9/17/2014	na	77%	81%	2.2	Rested

<sup>a</sup> September 17, 2014 data was collected during a Multiple Indicator Monitoring Implementation Training session. Large flooding had recently occurred on the Threemile Creek site, so short term indicators were not taken.

### **Interpretation.**

**Is further evaluation needed?** The Forest Plan states that the variation which would cause further evaluation and/or change in management direction for southern leatherside is a 20% decline in occupied habitat Forest-wide in any 5-year period, or a major change in age class structure or reproductive success. While the potential loss of the 1.6 miles of occupied habitat on Bear Creek would only be a 7% decline in Forest-wide occupied habitat, the full distribution of southern leatherside in Bear Creek should be evaluated in FY2015.

The Forest Plan States that the variation which would cause further evaluation and/or change in management direction for bank stability is a 20% variation from specifications of Standards and Guidelines. The Forest Plan standard for bank stability is 50%. While all stations sampled had bank stability higher than 50%, more recent science suggests that banks stabilities as high as 80% may be necessary to maintain the configuration of most stable channel types. Three of the four stations sampled had bank stability below 80%.

The Forest Plan standard for stream bank cover in Management Area 9A is 80%. None of the sites sampled were within designated 9A.

**What are the implications?** The 2009 and 2014 data suggest that an increase in nonnative brown trout may have decreased the abundance of southern leatherside in Bear Creek; however, brown trout standing crop in 2006 was only 12% lower than in 2014 and southern leatherside were still found during the 2006 sampling effort. Unfortunately the 2006 data only shows southern leatherside being present and native minnows and suckers being abundant as a whole, so it is difficult to ascertain whether increased brown trout standing crop is responsible for the decline in southern leatherside.

The East Fork Sevier River (Mill Hollow confluence – 7052) station is downstream from Tropic Reservoir and subject to erratic flow releases for irrigation. Large bare point bars were present throughout this station and the sediment transport budget appeared out of balance here which is not unexpected in a regulated stream with an altered and erratic flow regime (Figure 5). Despite these obvious stream channel stability issues, bank stability still came out considerably higher than the Forest Plan objective of 50%, providing some additional local evidence that this objective may be too low. This site was meeting riparian vegetation objectives in 2012 and showed an upward trend in riparian vegetation from 2007 sampling.

The Bear Creek (7045) station was visited before the season of use identified in the 2014 Annual Operating Instructions, but bank alteration had already exceeded the annual use criteria set in those Annual Operating Instructions. As noted in the native cutthroat trout section, the bank alteration noted here may have contributed to some of the instability measured during this sampling effort; however, exceeding the annual use criteria may also be contributing to stream bank stability issues at this location as bank stability was measured below 50% on this allotment near the Bear Valley Guard Station in FY2013 (Dixie National Forest, 2014). When sampled in 2012 the Bear Creek (7045) station was meeting riparian vegetation objectives and showed a stable trend from 2007.

The Bear Creek (A-4) location was also located in the same pasture as the Bear Creek 7045 station and it showed that bank alteration was below the annual use criterion for that pasture after the season of use, which may represent some level of alteration healing between May and September or disproportionate use by livestock as the two sites are separated by about 1.1 miles of stream.

The Threemile Creek (7044) site is discussed in the native cutthroat trout section.

**Conclusion.** Increases in brown trout standing crop coincided with a large decline in southern leatherside in Bear Creek on the Forest. Downstream on BLM lands suggesting that temperatures may be too warm to support trout in the downstream reaches of Bear Creek.

The potential loss of southern leatherside in Bear Creek on the Forest 2014 would result in a 7% decline in range for southern leatherside on the Forest.

Unauthorized use prior to the timing specified in Annual Operating Instructions appears to be contributing the exceedance of the bank alteration annual use criteria in some pastures.

Visual observations of poor overall bank stability in areas with greater than 50% bank stability (e.g. East Fork Sevier River 7052 – Mill Hollow Confluence) indicate that the 50% bank stability in the Forest Plan objective may be too low. This is supported by more current science than the Forest Plan (Overton, McIntyre, Armstrong, Whitwel, & Duncan, 1995; Leffert, 2005).

### **Monitoring Resources Available.**

Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR.

Without continued funding of a seasonal monitoring work force, the Forest will be unable to collect habitat monitoring data.

### **Recommendation.**

- Continue to work with UDWR to accomplish southern leatherside monitoring objectives, while identifying potential population expansion opportunities for the species. Resample all remaining southern leatherside streams on the Forest in 2015 and 2016.
- The full distribution of southern leatherside in Bear Creek on the Forest should be reevaluated to determine status in this stream.
- Based on data reported in 2011-2014, discharge and temperature measurements should be continued on both East and West Fork Hunt Creek to compare with future fish results and determine the potential persistence of this population.
- Management activities that encourage riparian vegetation growth and stream bank stability should be considered on West Hunt Creek.
- During the 2015 grazing season special attention should be given to the pastures containing sites that did not meet bank stability or bank cover objectives in 2014.
- If bank stability as measured by the MIM protocol is to be used as a long-term indicator of bank stability, measurements should be made before livestock are turned out on that pasture.



- Bank stability, cover and greenline to greenline width measurements should be retaken prior to season of use at the Bear Creek (7045) site if unauthorized use has not taken place.
- Bank stability, cover and greenline to greenline width monitoring should be repeated in 3-5 years in order to develop trend data for these locations.
- Ensure adherence to the terms and conditions of the grazing permits and the Annual Operating Instructions for livestock allotments.
- Work to develop site specific bank stability and greenline to greenline width objectives in Allotment Management Plans.



**Figure 5.** Sediment transport issues and bank erosion are present on the forest.



**Figure 6.** Southern leatherside collected in Swain's Creek in 2014.

## H. Nonnative trout: brook, brown, rainbow, cutthroat, hybrids

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Non-native trout: brook, brown, rainbow, cutthroat, hybrids	Accepted methods, such as gill netting, electro-shocking, or creel census, in coordination with UDWR when possible. 5-year revisit interval; at least 15 streams per year. Annual reporting.	M/H	20% total decline in estimated biomass(streams)/catch rate(lakes/reservoirs) Forest-wide over a 5-year period or a major change in size or quality of catch.
Compliance with State Water Quality Standards	Baseline monitoring described in Dixie Water Quality Monitoring Plan	M/M	Violation of State of Utah Water Quality Standards
Fish/Riparian habitat	Vegetative composition and age class surveys, Dixie water quality monitoring plan, aquatic MIS habitat surveys per MIS monitoring.	H/H	20% variation from specifications of Standards and Guidelines

### Methods.

Nonnative trout sampling across the Forest is accomplished by cooperative efforts between Forest personnel and UDWR. While some sampling is conducted by each agency independently, sampling results are shared to maximize each agency's effectiveness. Sampling in streams consists of multiple pass depletion population estimates using a backpack electrofisher. Fish are collected, enumerated, measured for total length and weighed. Density, standing crop and condition factor are calculated. Sampling in lakes consists of gill netting efforts. Fish are collected, enumerated, measured for total length and weighed. Catch rate and condition factor are calculated. Qualitative sampling is conducted in several streams to determine species composition and distribution. Qualitative sampling consists of sampling high quality fish habitat with a backpack electrofishing unit.

Water temperature was monitored with Stowaway Tidbit Temp Loggers (Onset Computer Corporation). Loggers were placed inside steel pipes with holes drilled in them and attached to rocks or roots with steel cables. Loggers recorded temperature every 15 minutes.

Bank alteration, stream bank stability and bank cover was evaluated in and immediately upstream from nonnative MIS trout habitat, as well as in non-fish bearing aquatic habitat using the Multiple Indicator Monitoring methodology (Burton, Smith, & Cowley, 2011).

### Variation.

The variation that would cause further evaluation and/or change in management direction is a 20% decline in estimated biomass (streams)/catch rate (lakes/reservoirs) Forest-wide over a 5-year period or a major change in size or quality of catch.

The variation that would cause further evaluation and/or change in management direction for water temperature is a violation of Utah Water Quality standards.

The variation which would cause further change in bank stability and bank cover is a 20% variation from specifications of Standards and Guidelines.

## Results.

Qualitative sampling for MIS presence/absence or distribution confirmation was completed along 8 streams in FY2104 (Table 8). Sampling in Little Pinto Creek confirmed that no fish are present in the section upstream from Page Ranch and that this section is seasonally intermittent, at least in certain years. The nonnative virile crayfish (*Orconectes virilis*) was found to be present in this area. Sampling in Little Pine Creek showed that it has mostly recolonized with nonnative fish, presumably from Upper and Lower Enterprise reservoirs following flooding in 2010. Speckled dace were found at the downstream most site sampled, while the site closest to the reservoirs contained all four nonnative fish species that were collected. As in Little Pinto Creek, the nonnative virile crayfish (*Orconectes virilis*) was found to be present in this area. Sampling in Reed Valley Creek found brook trout and cutthroat trout from the spring source downstream to the volcanic rim above Mammoth Creek. Fin clips were taken from cutthroat trout and submitted for genetic analysis. No fish were found in sampling upstream from the exclosure on Station Creek in 2013 (Dixie National Forest, 2014). Sampling in two locations within and downstream from the exclosure in 2014 also failed to detect fish, indicating that Station Creek is probably fishless as previously indicated.

As described in the native cutthroat trout section a variety of qualitative sampling was conducted throughout the Mammoth Creek drainage in an effort to delineate the current distribution of BCT in the drainage. Sampling in Tommy Creek near the spring source confirmed 2010 sampling downstream indicating this stream is probably fishless. Other than Tommy Creek, brook trout were found distributed throughout all the locations sampled in the Mammoth Creek drainage. Brown trout are distributed at least as far upstream as the Rainbow Meadows subdivision on Mammoth Creek and up to the base of the large pond in the Meadow Lakes subdivision. Rainbow trout are distributed from somewhere downstream of Castle Creek through the Mammoth Creek subdivision and in the unknown tributary that drains John L. Flat and Dead Lake.

**Table 8.** Qualitative stream fish sampling sites, DNF Ranger District and fish species collected in FY2013.

Sampling site	Ranger District	Species collected
Little Pinto Creek	Pine Valley	None
Little Pine Creek	Pine Valley	Rainbow trout, speckled dace, green sunfish, smallmouth bass, fathead minnow
Unnamed tributary to Mammoth Creek (Dead Lake/John L. Flat)	Cedar City	Rainbow trout, brook trout
Reed Valley	Cedar City	Cutthroat trout, brook trout
Tommy Creek	Cedar City	None
Mammoth Creek	Cedar City	Bonneville cutthroat trout, brook trout, brown trout, rainbow trout, BCT

		X rainbow trout
Unnamed Tributary to Mammoth Creek	Cedar City	Bonneville cutthroat trout, brook trout, brown trout
Station Creek	Fremont River	None

Quantitative sampling for MIS nonnative trout was completed at 18 locations on 14 streams in 2014 (Table 9). Average standing crop of MIS nonnative trout for DNF streams sampled in 2014 was 110 kg/ha. This would be considered above average when compared to other southern Utah trout streams (Hepworth & Beckstrom, 2004). Average standing crop of MIS nonnative trout during DNF quantitative fish sampling efforts from 2003-2014 was 133 kg/ha. The average standing crop for sites sampled in 2014 was lower than the DNF average but was still within the range of standing crop estimates from prior years.

Of the 2014 quantitative sampling sites 11 had a MIS nonnative trout standing crop estimate available from a prior year's sampling effort. The percent change in standing crop between the prior year's sampling effort and 2014 was extremely variable ranging from a 100% decline to a 210% increase. On average the standing crop estimates for the aforementioned 11 sites sampled in 2014 increased by 26% over the estimates from the prior years.

**Quantitative stream fish sampling site, Dixie National Forest Ranger District, Management Indicator Species (MIS), standing crop of the MIS, the previous year the stream was sampled, and the percent change in MIS trout standing crop between years. na = not available**

Sampling site	Ranger District	MIS	Standing crop (kg/ha)	Previous sample year	Percent change in standing crop
Pinto Creek	Pine Valley	Rainbow trout	61	na	na
Dairy Canyon	Cedar City	NA	0	2007	-100
Deer Creek - upstream	Cedar City	Brook trout	134	2008, 2003	15
Deer Creek - downstream	Cedar City	Brook trout	207	2008, 2003	14
Mammoth Creek (Hancock Peak)	Cedar City	Brook trout, brown trout	218	2010	63
Mammoth Creek - Station #2	Cedar City	Brook trout, brown trout	82	na	na
Reed Valley Creek - Station 1	Cedar City	Brook trout	122	na	na
Reed Valley Creek - Station 2	Cedar City	Cutthroat trout, brook trout	12	na	na
Reed Valley Creek - Station 3	Cedar City	Brook trout	10	2012	-93
Fife Creek	Cedar City	Rainbow trout	14	na	na

Sampling site	Ranger District	MIS	Standing crop (kg/ha)	Previous sample year	Percent change in standing crop
Crawford Creek	Powell	Brook trout, cutthroat trout	211	na	na
Kanab Creek	Powell	Brown trout, brook trout	124	2009	27
Podunk Creek	Powell	Brook trout	213	2009	210
Robinson Canyon	Powell	Brook trout, cutthroat trout	129	2009	39
East Fork Deer Creek	Escalante	Brook trout	159	na	na
Lake Creek	Escalante	Brook trout	99	2007	-10
Boulder Creek	Fremont River	Brook trout	138	2006	116
Pleasant Creek below SR12	Fremont River	Brook trout, rainbow trout	169	2003	6
<b>Average</b>			110		26

Gill net surveys for nonnative trout were completed at 11 lakes across the Forest (Table 10). Values between 20 and 40 fish per net/night are usually considered optimal for management of sport fish lakes across southern Utah (Hepworth & Beckstrom, 2004). Six of the 11 eleven lakes sampled had catch rates within this range. Six of the lakes sampled showed a decline in catch rate greater than 20%. Forest wide MIS nonnative trout catch rates in lakes appear to be stable; however, some lakes have occasional bouts of winterkill. From 2001-2014 an average of ten lakes a year have been sampled and catch rates have averaged 33 fish/net night.

**Table10.** Lake sampling site, Dixie National Forest Ranger District, Management Indicator Species (MIS), standing crop of the MIS, the previous year the lake was sampled (sampling data from 2001-2010 included), and the percent change in MIS trout catch rate between years. Data provided courtesy of Utah Division of Wildlife Resources. na = not available

Lake	Ranger District	Species	Catch rate	Previous sample year	% change from previous sample
Chuck Lake	Fremont River	Brook trout, cutthroat trout	0	2006	-100
Crater Lake	Escalante	Brook trout, Arctic grayling	17	2010	0



Dead Lake	Escalante	Brook trout, Arctic grayling	34	1981	Increase <sup>a</sup>
Deer Creek Lake	Escalante	Brook trout, cutthroat trout	32	1987	88
Green Lake	Escalante	Cutthroat trout	7	1958	-53
Lower Bowns Reservoir	Fremont River	Rainbow trout, tiger trout	25	2011	127
Navajo Lake	Cedar City	Splake, rainbow trout	16	2011	-33
Oak Creek Reservoir	Fremont River	Brook trout	21	2011	-28
Panguitch Lake	Cedar City	Rainbow trout, cutthroat trout, tiger trout	45	2013	-5
Paragonah Reservoir	Cedar City	Rainbow trout, tiger trout	28	2011	-26
Surveyors Lake	Fremont River	Brook trout	11	2001	-84
Average			21		-11.4

<sup>a</sup> No fish were collected in Dead Lake in 1981.

Results of temperature monitoring were available for six locations on two streams that have MIS nonnative trout populations in 2014 (Table 10). The East Fork Sevier River above Tropic Reservoir, Red Creek and the Santa Clara River are all classified as Class 3A streams by the State of Utah with a maximum temperature criterion of 20.0°C to meet the beneficial use for cold water aquatic life. In five years of continuous temperature monitoring from May 2009 through June 2014 Red Creek never exceeded 20.0°C. All three sites where temperature was monitored on the East Fork Sevier upstream from Tropic Reservoir exceeded the 20°C standard in both 2013 and 2014. Similarly, the Santa Clara River below the town of Pine Valley exceeded this standard every year between 2011 and 2014. The Santa Clara River near the Forest Boundary by the town of Central reached 20.0°C in 2014 and just exceeded 20.0°C in 2013.

Published literature suggests that brown trout and rainbow trout have optimum survival and growth at temperatures between 10.0°C and 19.0°C while brook trout have optimal temperatures slightly lower than this (Sigler & Sigler, 1996; Bell, 2006; Belica, 2007; Montgomery & Bernstein, 2008; Ficke, Peterson, & Janowsky, 2009). Temperatures greater than 22.0°C can have detrimental effects to growth and survival of brown trout and rainbow trout, while temperatures greater than 27.0°C for more than extremely short durations are likely to cause mortality (Lee & Rinne, 1980; Sigler & Sigler, 1996; Carline & Machung, 2001; Bell, 2006; Wehrly, Wang, & Mitro, 2007; Belica, 2007; Montgomery & Bernstein, 2008). Brook trout have been found to have an upper lethal limit between 25°C and 28°C, but are not often found in waters with maximum temperatures higher than 22°C, most likely because of the physical and metabolic effects of these temperatures (Lee & Rinne, 1980; Wehrly, Wang, & Mitro, 2007; Chadwick, 2012).

**Table 10.** Location, year, dates of deployment, average temperature for dates of deployment, maximum temperature for dates of deployment, summer (June-September) average temperature, summer maximum temperature and summer maximum diel fluctuation for temperature probes deployed in nonnative trout Management Indicator Species habitat. All temperatures are in degrees Celsius.

Stream	Year	Dates deployed	Average	Maximum	Summer average	Summer maximum	Summer diel fluctuation
East Fork Sevier River (above Tropic Reservoir)	2013	5/8/2013-12/31/2013	10.3	23.1	15.8	23.1	9.3
East Fork Sevier River (above Tropic Reservoir)	2014	1/1/2014-9/9/2014	9.3	23.7	15.0	23.7	9.4
East Fork Sevier River (below Kanab Creek)	2013	5/8/2013-12/31/2013	9.3	22.1	14.1	22.1	10.3
East Fork Sevier River (below Kanab Creek)	2014	1/1/2014-9/9/2014	8.3	21.9	13.5	21.9	9.1
East Fork Sevier River (above Crawford Creek)	2013	5/8/2013-12/31/2013	9.5	22.8	14.9	22.8	11.6
East Fork Sevier River (above Crawford Creek)	2014	1/1/2014-9/9/2014	8.5	21.8	14.3	21.8	9.8
Red Creek	2009	5/5/2009-12/31/2009	6.9	18.7	10.6	18.7	11.0
	2010	1/1/2010-12/31/2010	5.0	18.7	10.6	18.7	10.1



Stream	Year	Dates deployed	Average	Maximum	Summer average	Summer maximum	Summer diel fluctuation
	2011	1/1/2011-12/31/2011	4.7	15.8	9.8	15.8	8.1
	2012	1/1/2012-12/31/2012	5.6	18.8	11.3	18.8	11.3
	2013	1/1/2013-12/31/2013	5.2	19.0	11.2	19.0	11.0
	2014	1/1/2014-6/15/2014	3.2	15.5	na	na	na
Santa Clara (below Pine Valley)	2011	6/6/2011-12/31/2011	9.4	22.9	13.2	22.9	10.9
	2012	1/1/2012-11/3/2012	10.5	26.8	16.6	26.8	17.2
	2013	5/9/2013-12/31/2013	11.4	27.3	16.6	27.3	14.7
	2014	1/1/2014-11/21/2014	10.7	26.6	17.2	26.6	13.7
Santa Clara (Central)	2013	5/9/2013-12/31/2013	14.0	20.2	16.9	20.2	4.4
	2014	1/1/2014-11/21/2014	14.0	20.0	16.8	20.0	4.2

Bank alteration, bank stability, bank cover and greenline to greenline width were measured at 17 locations on 11 different streams (Table 11). All 17 locations were in association with Integrated Level II Riparian Inventory locations. Additionally just bank alteration was measured at three locations on streams that bank stability and cover were measured in 2013 (Dixie National Forest, 2014). Average bank alteration collected at sites that were evaluated during or after the season of use specified in 2014 Annual Operating Instructions was 32%, while average bank alteration at sites measured before the season of use specified in 2014 Annual Operating Instructions was 7%. All but two of the seven sites measured during or after the season of use specified in 2014 Annual Operating Instructions had bank alteration measuring more than 20%. One of those sites was within an enclosure (East Fork Sevier River - Seiler Meadow Enclosure - 6050) and the other site (Crawford Creek - 5062) was already at 17% bank alteration on the second day of the season of use listed in the 2014 Annual Operating Instructions for that pasture and is assumed to have exceeded 20% by the end of the pasture rotation.

Four sites assessed in 2014 had previous data collected in 2013. Crawford Creek showed high levels of bank alteration and relatively low levels of bank stability (57%) in 2013. Bank alteration collected on the second day of the season of use specified by the 2014 Annual Operating Instructions indicated that bank alteration was probably exceeded at the Crawford Creek station again in 2014. In 2013 the Red Creek (6025) and Red Creek (Downstream fish) sites were assessed prior to the season of use specified by the 2013 Annual Operating Instructions and found to have relatively low levels of bank stability. Measurements of bank alteration in 2014 during and after the season of use specified by the 2014 Annual Operating Instructions showed bank alteration was greater than 20% at both of these sites.

Visual observations on Mill Creek over the past 5 years suggested that bank stability was higher than that measured at the Mill Creek (3025) site during 2013 monitoring efforts (35%). Monitoring in 2014 prior to the season of use specified by the 2014 Annual Operating Instructions showed bank stability at this site to be 100%.

Average bank stability across all 17 sites assessed in 2014 was 86%. Only two of the sites had bank stability measurements of less than 50%. The average percent of banks covered across all 17 sites was 92%. Eight of the sites were within Riparian Management Areas (9A/9B). The average percent of covered banks at these 8 sites was also 92%. None of the sites within Riparian Management Areas (9A/9B) had less than 80% of the banks covered measured.

**Table 11.** Stream, UTM location, date of sampling effort, percent bank alteration, percent bank stability, percent bank cover and greenline to greenline width (GGW) as measured by Multiple Indicator Monitoring protocol in nonnative trout Management Indicator Species habitat (Burton, Smith, & Cowley, 2011).

Stream	Northing	Easting	Date	Bank alteration	Bank stability	Bank cover	GGW (m)	Timing
Pinto Creek (Cove Hollow Confluence - 1404)	276739	4159638	7/2/2014	38%	84%	88%	2.6	During
Pinto Creek (Upper - 5023)	279162	4153789	5/22/2014	6%	91%	97%	3.6	Before
Santa Clara River (Burgess Pasture - 9015)	278887	4141155	6/30/2014	46%	45%	50%	3.7	During
Mammoth Creek (Brian Head - 6134)	341670	4169168	7/1/2014	3%	94%	93%	2.4	Before
Red Creek (6025)	351690	4189492	8/11/2014	32%	na	na	na	During
Red Creek (Cool Spring - 1334)	350904	4193221	7/3/2014	3%	48%	86%	5.9	Before
Red Creek (Downstream Fish)	352254	4191527	9/11/2014	27%	na	na	na	After
Red Creek Reservoir Inlet (6024)	352648	4191200	6/3/2014	7%	85%	93%	4.1	Before

Stream	Northing	Easting	Date	Bank alteration	Bank stability	Bank cover	GGW (m)	Timing
Unnamed tributary to Red Creek (6026)	352860	4189681	6/3/2014	10%	85%	98%	1.2	Before
Unnamed tributary to Red Creek (Williamson - 8126)	352856	4188753	6/3/2014	10%	94%	100%	1.0	Before
Blubber Creek (5058)	385754	4156403	7/24/2014	57%	91%	94%	4.6	After
Crawford Creek (5062)	384785	4147290	8/12/2014	17%	na	na	na	During
East Fork Sevier River (Blubber Creek Confluence - 5059)	387416	4156535	7/8/2014	16%	92%	93%	4.6	Before
East Fork Sevier River (Blue Fly Confluence - 5054)	391372	4167285	8/11/2014	2%	84%	88%	4.7	Before
East Fork Sevier River (Seiler Meadow Exclosure - 6050)	383428	4146967	8/12/2014	5%	99%	100%	5.0	During
East Fork Sevier River (Tropic Reservoir - 1020)	389690	4162768	7/24/2014	1%	87%	95%	3.9	Before
Lower Podunk Creek (5061)	385937	4150491	6/5/2014	14%	99%	100%	5.3	Before
Mill Creek (3025)	381309	4143774	7/8/2014	9%	100%	100%	1.1	Before
Robinson Canyon (7060)	380116	4143972	7/24/2014	6%	95%	98%	1.1	Before
West Fork Deer Creek (Moosman Reservoir - 1320)	464583	4209796	6/26/2014	10%	85%	99%	1.2	Before
<b>Average</b>					86%	92%	3.3	

<sup>a</sup> Site is located within Riparian Management Area (9A/B).

In addition to sites on fish bearing streams bank alteration, bank stability, bank cover and greenline to greenline width were measured at six locations along non-fish bearing streams in 2014. Cove Spring, Little Pinto Creek and Durfey Creek are all tributaries to fish bearing streams. Bank alteration at sites measured before the season of use listed in the 2014 Annual Operating Instructions averaged 9% bank alteration and sites measured during the season of use listed in the 2014 Annual Operating Instructions averaged 34% bank alteration.

Bank stability averaged 81% across all sites measured with bank stability being less than 80% at two sites and less than 50% at one of those sites. The average percent of the bank covered at the six sites was 95%. The Cottonwood Creek (6046) site was the only non-fish bearing stream site assessed that was within a Riparian Management Areas (9A/9B) and was the only site with the a measured percent of covered banks lower than 80%.

**Table 12.** Stream, UTM location, date of sampling effort, percent bank alteration, percent bank stability, percent bank cover and greenline to greenline width (GGW) as measured by Multiple Indicator Monitoring protocol in non-fish bearing streams (Burton, Smith, & Cowley, 2011).

Stream	Northing	Easting	Date	Bank alteration	Bank stability	Bank cover	GGW (m)	Timing
Cove Spring (7009)	276025	4159519	8/12/2014	40%	43%	99%	0.8	During
Little Pinto Creek (Page Ranch – 5024)	286260	4160057	5/16/2014	5%	97%	99%	1.1	Before
Cottonwood Creek (6046)	353173	4205416	6/12/2014	9%	66%	75%	2.8	Before
Upper Cottonwood Creek (7046)	357967	4202530	5/28/2014	16%	88%	95%	1.1	Before
Willow Spring (1335)	352570	4186737	7/3/2014	7%	96%	100%	0.3	Before
Durfey Creek (1319)	456582	4210053	6/25/2014	27%	93%	96%	0.5	During
Average					81%	94%	1.2	

### Interpretation.

**Is further evaluation needed?** The Forest Plan States the variation that would cause further evaluation and/or change in management direction is a 20% decline in estimated biomass (streams)/catch rate (lakes/reservoirs) Forest-wide over a 5-year period or a major change in size or quality of catch. Data collected between 2009 and 2013 do not suggest a Forest-wide decline in nonnative trout biomass, catch rate, or size and quality, suggesting no further evaluation is needed. Declines of greater than 20% in MIS trout standing crop occurred at two of the 11 stream sites with multiple years of quantitative sampling data: Dairy Canyon and the upper most station on Reed Valley Creek. Declines greater than 20% occurred at 6 of the 11 lakes sampled in 2014: Chuck Lake, Crater Lake, Navajo Lake, Oak Creek Reservoir, Paragonah Reservoir and Surveyors Lake.

Average trout standing crop for southern Utah trout streams approximately 65 kg/ha, while average MIS nonnative trout standing crop across the Dixie National Forest from 2002-2014 has been 133 kg/ha. Four sampling sites had MIS nonnative trout standing crop estimates

considerably less than 65 kg/ha in 2014: Reed Valley Creek Station #2, Reed Valley Creek Station #3, Dairy Canyon and Fife Creek.

The Forest Plan also states that the variation which would cause further evaluation and/or change in management direction for water temperature is a violation of State Water Quality Standards. State water quality standards were violated at one or more years between 2011-2014 in the East Fork Sevier and the Santa Clara River suggesting that temperature may be affecting the beneficial use designation of these streams.

The Forest Plan States that the variation which would cause further evaluation and/or change in management direction for bank stability and stream bank cover is a 20% variation from specifications of Standards and Guidelines. The Forest Plan standard for bank stability is 50% and the Forest Plan standard for stream bank cover is 80% in Riparian Management Areas (9A). More recent science would suggest that desired bank stability should be considerably higher (up to 80%) for most channel types (Overton, McIntyre, Armstrong, Whitwel, & Duncan, 1995; Leffert, 2005). Three of the sites assessed in 2014 had bank stability measurements of less than 50% and one additional site showed bank stability less than 80%.

The percent of banks covered measured less than 80% at one site within Riparian Management Areas (9A/9B).

**What are the implications?** The monitoring station on Dairy Canyon is within the perimeter of the 2012 Shingle Fire which burned the headwaters of both Stout and Dairy Canyons. Several storm events since that fire have caused large flood events in both these canyons. Similar to what the 2013 sampling in Stout Canyon concluded, sediment, ash and high flows following the Shingle Fire is the probable cause for the loss of the brown trout population in Dairy Canyon.

Reed Valley Creek saw a dramatic decline in trout density and standing crop between 2012 quantitative sampling and 2014 quantitative sampling and only brook trout were collected, whereas cutthroat trout had been collected in prior survey efforts. A cutthroat trout was collected upstream from the sampling station. This area has been sampled heavily since 2012 in efforts to collect enough fin clips to determine the genetic origin of the cutthroat trout in this stream. Stress and latent mortality from sampling efforts may have played a role in the decline of this fishery.

Reed Valley Creek Station #2 was not far downstream from Reed Valley Creek Station #3 and was located in a relatively high gradient section of stream. Reed Valley Creek is also fairly small (wetted width 0.8 m). All of these factors could have contributed to the low standing crop of MIS nonnative trout in this stream. Higher standing crops were observed at the downstream station on Reed Valley Creek and all these stations will be reevaluated after BCT restoration has occurred.

Fife Creek was not known to contain a fish population prior until anecdotal reports were made to the Forest Fish biologist in 2013. Fife Creek was sampled just upstream from the Forest boundary and was a small stream with a very high fine sediment load. Pools were sparse and relatively shallow (average maximum depth = 0.18 m) and 50% of the fish collected were found in the deepest (0.3 m) pool within the area sampled. This stream appears habitat limited and rainbow trout collected here are probably upstream migrants from ponds located on private lands downstream from the Forest.

Chuck Lake, Crater Lake, Oak Creek Reservoir and Surveyors Lake were all sampled to determine a baseline for their new management under the Boulder Mountain Sportfish Enhancement Plan (Boulder Mountain Sport Fish Advisory Committee, 2014). Under the plan each of these lakes has been given a clearly defined management level that UDWR will try to accomplish through changes to stocking rates, species complement and/or other management. Adjustments will be implemented and sampling 3-10 years into the future will determine success of management actions for these lakes.

Navajo Lake has seen a decline in catch rate as Utah chub numbers have increased and splake have become the dominant trout species (Hadley M. , 2014a).

Paragonah Reservoir has shown variable catch rates over the history of trend netting there (Hadley M. , 2014b). This reservoir has a wild population of rainbow trout prolific enough that it generally supports an overpopulated, stunted rainbow trout fishery. New net designs may be at least partially responsible for lower catch rates seen at Paragonah Reservoir; however, actual declines in abundance could improve the quality of the fishery.

Temperatures in the East Fork Sevier River appear to be on the border for causing metabolic effects to nonnative trout in these waters and previous sampling has shown that trout populations in this area have a standing crop that is average to below average when compared to other southern Utah trout streams (Hepworth & Beckstrom, 2004; Golden & Mecham, 2010a; Golden M. , 2013). High temperatures may be negatively MIS nonnative trout populations in the East Fork Sevier River.

The Santa Clara River below the town of Pine Valley has seen maximum temperatures near the thermal maximum for brown trout and rainbow trout populations that inhabit this portion of the river. These high temperatures may explain the wide variability in MIS trout standing crop observed between Pine Valley and the Forest boundary in previous years (Golden M. , 2013). Water diversion in synergy with annual precipitation and weather patterns probably has a large influence of temperatures in the Santa Clara River.

The results of both 2013 and 2014 assessments of bank alteration, bank stability and bank cover, show that the bank alteration annual use criterion (< 20%) is being exceeded in multiple areas across the Forest (Dixie National Forest, 2014). This supports visual observations of bank alteration greater than 20% made in the past. The bank alteration annual use criterion is the short-term indicator for bank stability. Consistent exceedance of this criterion may result in a downward trend in stream bank stability in some locations.

The results of 2014 bank stability assessments across the Forest showed higher bank stability than the results of 2013 assessments (average 86% stable in 2014 versus 60% stable in 2013). The variability seen in the two bank stability measurements made at the Mill Creek (3025) site between 2014 and 2013 appears to be a function of the amount of bank alteration present during the two visits. Bank alteration during the 2013 visit following the season of use specified in the 2013 Annual Operating Instructions was measured at over 70%, meaning over 70% of the linear distance of the stream bank was trampled sheared or sloughed. When the bank is this altered on a small stream with moist banks multiple alterations in close proximity can present as an instability feature, such as a bank fracture or slump as defined in the MIM

protocol. If the alterations subsequently heal over with vegetation, they would not be classified as an instability feature.

The Santa Clara River (Burgess Pasture - 9015), Red Creek (Cool Spring - 1334) and Cove Spring (7009) sites all showed bank stabilities lower than 50%; however, the Cove Spring(7009) and Santa Clara River (Burgess Pasture - 9015) sites were both sampled during the season of use and showed relatively high levels of bank alteration (>40%). Photos from the Burgess Pasture location indicate that a high level of instability was present despite bank alteration; whereas some of the instability noted at the Cove Spring site may be attributable to the high level of bank alteration (Figures 7 and 8). Data from 2009 and 2014 showed that the Santa Clara River (Burgess Pasture – 9015) had a large downward movement in the percent of late seral vegetation along the greenline (19.6%) between those two years. Since the trend was downward this site did not meet its riparian vegetation objectives in 2014. Data from 2007 and 2012 showed that the Cove Spring (7009) site was meeting its riparian vegetation objectives with a stable trend. Conversely, Red Creek (Cool Spring - 1334) site was assessed prior to the season of use and still showed bank stability as being lower than 50% with only 9% bank alteration. This site was not meeting its vegetation objectives in 2013. This site is affected by dewatering and water releases from Red Creek Reservoir which probably influences both riparian vegetation establishment and bank stability at this location.

Bank stability and bank cover were both less than 80% at the Cottonwood Creek (6046), which is within a Riparian Management Area. This site is within an incision and appears to be struggling to redevelop adequate riparian vegetation within the incision. As with the Red Creek (Cool Spring - 1334) site this 6046 site was not meeting its vegetation objectives in 2006 or 2011 and had a stable trend. Despite these obvious stream channel stability issues, bank stability still came out considerably higher than the Forest Plan objective of 50%, providing some additional local evidence that this objective may be too low.



**Figure 7.** Slumping banks at the Santa Clara River – Burgess pasture (9015) site in June 2014.





**Figure 8.** Bank alteration at Cove Spring (7005) that may heal before the next season of use that may have be measured as bank instability in August 2014.

**Conclusion.** While individual streams, lakes and years may vary in standing crop and catch rate estimates for nonnative trout, Forest-wide nonnative trout populations appear stable and have standing crop and catch rate estimates above average when compared to other southern Utah trout streams.

The Shingle Fire has eliminated brown trout from both Dairy and Stout Canyon on National Forest lands.

While the results of 2013 sampling indicated that measuring bank stability before and after livestock use showed a difference in the percentage of stable banks that was 10% or less, data from 2014 showed that this difference can be considerably larger. High levels and concentrations of bank alteration appear to be responsible for this discrepancy.

Unauthorized use prior to the timing specified in Annual Operating Instructions appears to be contributing the exceedance of the bank alteration annual use criteria in some pastures.

Visual observations of poor overall bank stability in areas with greater than 50% bank stability (e.g. Cottonwood Creek – 6046) indicate that the 50% bank stability in the Forest Plan objective may be too low. This is supported by more current science than the Forest Plan (Overton, McIntyre, Armstrong, Whitwel, & Duncan, 1995; Leffert, 2005).

### **Monitoring Resources Available.**

Some money is available to fund monitoring activities on the Forest; however, without continued funding of a seasonal monitoring work force, the Forest will be reliant on data collected by UDWR.

Without continued funding of a seasonal monitoring work force, the Forest will be unable to collect habitat monitoring data.

### **Recommendation.**

- Continue to work with UDWR to accomplish nonnative trout monitoring objectives, while identifying potential project and management opportunities to benefit nonnative trout populations and sport fishing opportunity on the Forest.
- Continue to coordinate with UDWR regarding species and stocking rates in Forest lakes and reservoirs to maximize sport fishing opportunities.
- Support UDWR in implementation and monitoring of the Boulder Mountain and Panguitch Lake Sport Fish Management Plans, as well as adaptive management related to these plans.
- The effects of fire to fish and fish habitat should continue to be evaluated across the Forest and proactive measures to reduce the risk of catastrophic fire in key watersheds should be investigated.
- Reed Valley Creek is one of several streams in the Mammoth Creek drainage that will be renovated to remove nonnative fish and restore BCT. Additional evaluations of this stream and its fishery should be reserved until after BCT are restored.
- Physical habitat and water temperature should be evaluated as potential limiting factors for trout in the East Fork Sevier River and Santa Clara River downstream from the town of Pine Valley. Management activities that encourage riparian vegetation growth and stream bank stability should be considered on these streams.

- If bank stability as measured by the MIM protocol is to be used as a long-term indicator of bank stability, measurements should be made before livestock are turned out on that pasture.
- Ensure adherence to the terms and conditions of the grazing permits and the Annual Operating Instructions for livestock allotments.
- Work to develop site specific bank stability and greenline to greenline width objectives in Allotment Management Plans
- During the 2015 grazing season special attention should be given to the pastures containing sites that did not meet bank stability or bank cover objectives in 2014.
- Bank stability measurements should be retaken prior to season of use at the Santa Clara River (Burgess Pasture – 9015) and Cove Spring (7009) sites.

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## I. Habitat Diversity

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Habitat Diversity	Vegetative composition and age class surveys, calculation of Patton Edge-Shape Index from maps & air photos, annually in vegetative manipulation project areas; annual reporting.	M/H	Significant variation from standards and guidelines specifications; below 7% oldgrowth, less than 7% grass, less than 10% other age classes.

### Methods.

The Patton Edge-Shape Index has not been used since the Forest Plan was written as it is outdated. However, the Forest has been monitoring habitat diversity at various scales from the landscape level to the site-specific project level using several different sources. Some of these sources include the review of UDWR long-term range trend data, Forest stand exam data, Vegetational Structural Stage (VSS), GAP data, old-growth evaluation at project level scales, soil surveys, visual reconnaissance, and Forest range trend data. This information has been documented and reviewed from the site-specific level to the planning unit level, and is catalogued in core GIS layers.

### Variation.

The variation that would cause further evaluation and/or change in management direction is a significant variation from standards and guidelines specifications. This consists of edge contrast, and percent of habitats in a variety of structural and age classes.

### Results.

In reviewing Forest standards and direction, and project level information and monitoring, edge habitat for terrestrial species is not lacking and is adequate in abundance and distribution to support the species that use edge. Although it was not logistically or economically feasible to assess every project that modified wildlife habitat diversity across the Dixie National Forest, sample projects have been looked at and edge is present in abundance with good distribution.

### Interpretation.

**Is further evaluation needed?** Adequate information is available to determine how the Forest is managing for edge. Additional data collection and analysis would be beneficial in looking at the landscapes across the Forest, but not necessary to be compliant with the Forest Plan.

**What are the implications?** Maintenance of diversity on the National Forest has not been tracked or measured using the above methods, however, the Forest is using other more up to date methods to track diversity of habitat as it pertains to edge across the Forest.

**Conclusion.** Wildlife edge habitat is abundant and well distributed across the Forest based on the project level information gathered annually.

#### **Monitoring Resources Available.**

Project level resources are being used to help determine edge habitat across the forest. In addition, GIS, stand exams, VSS analysis, aerial photo interpretation, satellite imagery, and Properly Functioning Condition assessments are all available and used across the Forest. These tools are more widely used and are accepted means of monitoring edge habitat distribution and abundance

#### **Recommendation.**

The Patton Edge-shape Index should be replaced as a monitoring tool.

#### **Citations**

Patton, D.R. 1975. A diversity index for quantifying habitat edge. Wildl. Soc. Bull., 3, pp. 171-173.

## **J. Snag Management**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Snag management	Pre-sale, post-sale, post-fire wood count and condition survey for each sale; annual reporting.	H/H	10% below specifications of standards and guidelines.
Is snag habitat (i.e., number and size of snags) being maintained in desired spatial arrangement?	Snag densities and sizes within a 100-acre block treated by mechanical or wildland fire use. Measure 10% or more of the acres treated within a project area, within 2 years following completion of the vegetative treatment; five-year reporting.	NA	Less than 75% of the blocks measured meet guideline requirement.

#### **Methods.**

The assessment of snags has been reviewed at the project-specific level and at landscape level analysis across the Forest. On areas proposed for vegetation treatments, the retention of snags as described in the Forest Plan has been managed. Snag densities have been monitored in correlation with woodpecker occupancy and density. Some of these results have been obtained through cooperative efforts with UDWR and university graduate studies. Vegetation treatment projects are designed to meet Forest Plan standards and guidelines.

### **Variation.**

The variation causing further evaluation is 10% below specifications of standards and guidelines for snags. The Utah Northern Goshawk Project Amendment states 75% or more of the blocks measured meet guideline requirements as an acceptable range.

### **Results.**

Snag data is collected at the project specific level on all vegetation projects across the Forest. Specific data is available with project records for each vegetation manipulation project.

### **Interpretation.**

**Is further evaluation needed?** Based on project level data review there is not a variation in snag abundance and distribution causing further evaluation and/or management change.

**What are the implications?** Snags are an important part of healthy ecosystems for soil nutrient recycling (after snags fall to the ground), for providing habitat for a multitude of birds, mammals, reptiles and insects, for providing structure in streams, and micro-site protection for seedling trees and other plants to grow. Based on project level data snags are well distributed across the Forest in Forested cover types.

**Conclusion.** Data contained in project records indicate that snag numbers and distribution are being met and that this important habitat component is being maintained.

### **Monitoring Resources Available.**

Resources have been allocated to measure snags other than in stand exam data collected for silvicultural objectives. If funding were available additional data collection would be beneficial to assist with this evaluation with sub samples of existing data summarized and evaluated.

### **Recommendation.**

Develop criteria with which to prioritize areas for snag data collection especially in the Ponderosa pine type.

## **K. Fish/Riparian Habitat**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Fish/Riparian habitat	Vegetative composition and age class surveys, Dixie water quality monitoring plan, aquatic MIS habitat surveys per MIS monitoring; annual to develop baseline, every 5 years as needed thereafter; reporting as data collected.	H/H	20% variation from specifications of standards and guidelines.



## Methods.

The 2010 Aquatic Amendment specifies that vegetative composition, age class surveys, Dixie water quality monitoring plan, and aquatic MIS habitat surveys per MIS monitoring will be used to assess fish and riparian habitat.

## Variation.

A 20% variance from specifications of standards and guidelines would cause further evaluation or a change in management direction. Standards and guidelines for fish and riparian habitat are outlined in Aquatic Amendment.

## Results.

Results have been reported in the Native cutthroat trout, Virgin spindace, Southern leatherside, and Non-native trout sections of this report.

## L. Big Game Habitat Effectiveness

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Habitat effectiveness for big game	Annual road density: map, air photo; annual reporting.	M/M	10% below specifications of standards and guidelines
	Hiding, thermal cover; ground survey each timber sale. Reported annually	H/H	10-15% variation from specifications of standards and guidelines

## Methods.

Assessment of annual road density and hiding and thermal cover.

## Variation.

A variation 10% below specifications of standards and guidelines would indicate a need for further evaluation and/or management direction in road density. The guideline that relates to big game habitat effectiveness is on page IV-50, specifying that road densities should not exceed two miles per square mile of wildlife habitat. A variation 10-15% below specifications of standards and guidelines would indicate a need for further evaluation and/or management direction in hiding and thermal cover. The standards and guidelines that relate to these components of habitat effectiveness are on page IV-34; big game hiding cover is defined as that needed to hide 90% of a standing deer or elk at a distance of at least 200 feet.

## Results.

Open road motorized density (OMRD) was analyzed across the Forest for the 2009 Motorized Travel Plan (MTP) EIS.

**Open Motorized Road Density (OMRD) by existing condition and the selected alternative for mule deer Wildlife Management Units (WMU) within the planning area.**

WMU	Existing	MTP
Boulder Plateau	1.24	0.80
Kaiparowitz	1.66	0.69
Mt. Dutton	1.32	0.74
Panguitch Lake	2.15	1.53
Paunsaugunt	3.01	1.58
Pine Valley	1.05	0.76
Zion	2.67	2.54

**Open Motorized Road Density (OMRD) by existing condition and the selected alternative for Rocky Mountain elk Wildlife Management Units (WMU) within the planning area.**

WMU	Existing	MTP
Boulder Plateau	1.31	0.86
Kaiparowitz	1.67	0.71
Mt. Dutton	1.37	0.76
Panguitch Lake	2.07	1.44
Paunsaugunt	3.38	1.76
Zion	1.61	1.53

Data for hiding and thermal cover has not been compiled for this report, but is analyzed on a project-specific basis.

**Interpretation.**

**Is further evaluation needed?** Data for hiding and thermal cover is evaluated at the project specific level, in part by evaluating VSS class distribution. The Forest Plan guideline states that road densities over 2.0 miles per square mile may decrease habitat effectiveness. As MTP is implemented, OMRD will decrease on all units except Zion to densities below the guideline.

**What are the implications?** Road densities are calculated and displayed in each project analysis. Sufficient GIS capabilities exist for this analysis. Hiding cover is analyzed on a project-specific basis along all arterial and collector roads.

**Conclusion.** The variation causing further evaluation is road densities are 10% *below* the two miles per square mile standard and guideline. The intent for the guideline is that higher habitat effectiveness is desired and higher road densities decrease habitat effectiveness. Therefore, the variation should be written as 10% *above* guidelines.

Using open road densities for this calculation would be more meaningful for assessing big game habitat effectiveness. Roads themselves do not normally decrease habitat effectiveness; it is the use by motorized vehicles that causes a decrease in habitat effectiveness. Therefore, open road density is a good measure of habitat effectiveness for big game species. Open road

densities are continuing to change across the Forest as roads and trails are closed through MTP implementation and as unauthorized use changes. Habitat effectiveness has increased across the Forest as the MTP decision has been in the process of being implemented.

### **Monitoring Resources Available.**

Vegetation data at the project level has been collected, analyzed, and reviewed for big game habitat effectiveness. GIS systems calculate road mileage and acreages.

### **Recommendation.**

Retain open road density as a measure of habitat effectiveness for big game (change “road density” to “open road density”). Change the variation to read 10% *above* open road density specifications. Specify as a guideline. Prioritize areas to evaluate road density. Eliminate thermal cover from monitoring and requirements from the standards and guidelines look at VSS class distribution to evaluate thermal cover by cover type.

## **M. Occupied Goshawk Territories**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are known goshawk territories on national forests remaining occupied?	Goshawk territory occupancy at the Forest Level annually, reported every 3 years.	NA	Less than 20% decline in territory occupancy over a 3 year period is acceptable range.

See C. Northern Goshawk, above on page 8-33.

## **N. Goshawk Mitigation Measures**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are mitigation measures (standards and guidelines) employed during vegetative management project implementation sufficient to prevent territory abandonment?	Goshawk territory occupancy following vegetative management treatments. Monitor the first full breeding period following activity in all projects where pre-project surveys determined territory occupancy; annual reporting.	NA	Any territory abandonment on projects where mitigation measures are used.

**Methods.**

Monitor goshawk territory occupancy following vegetative management treatments. Monitor the first full breeding period following activity in all projects where pre-project surveys determined territory occupancy.

**Variation.**

Any goshawk territory abandonment on projects where mitigation measures were used. Territory abandonment occurs when nesting has been initiated and the birds leave the area and do not continue nesting.

**Results.**

Based on the increase in occupied goshawk territories across the Forest habitat effectiveness and territory use is up from previous years.

**Interpretation.**

**Is further evaluation needed?** Data collected at the Forest level on territory occupancy and use is very important to help determine if management guidelines are adequate. Because occupied territory use is up from previous years and habitat effectiveness appears to be adequate for use these measures are successful.

**What are the implications?** Mitigation measures used are still considered the best available science by the Forest and appear to be effective as numbers are up from previous years. .

**Conclusion.** Implementation of the Forest Plan guidance for goshawks is sufficient to prevent territory abandonments, recognizing that many factors can cause territory abandonment. There is a long list of environmental factors that can cause territory abandonments, including weather; either too much, or too little cold wet weather, lack of or decreased prey items, wind events and, predation from great horned owls or golden eagle to mention a few .

**Monitoring Resources Available.**

Project level data and Forest level monitoring data collection on territory occupancy and activity

**Recommendation.**

Determine projects where mitigation measures were prescribed and implemented and prioritize those projects for monitoring. Continue to monitor for occupancy and activity of all nests across the Forest.

## O. Goshawk Habitat Connectivity

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Is habitat connectivity, as represented by structural and species diversity and dispersion thereof, within and among 5th to 6th order watersheds (or equivalent ecological scale) being maintained?	Spatial dispersion and patch size of mature and old forest groups within a 5th to 6th order watershed. Tree species composition mix within mature and old groups within a landscape. At the completion of each landscape assessment. Five-year reporting.	NA	Less than approximately 40% of the coniferous and/or 30% of the aspen forested acres within a landscape in VSS 5 and 6 classes. Seral species characteristic of the cover type are not well-represented in VSS 5 and 6 classes.

### Methods.

Evaluate spatial dispersion and patch size of mature and old forest groups within a 5th to 6th order watersheds.

### Variation.

Approximately 40% of the coniferous and/or 30% of the aspen forested acres within a landscape in VSS<sup>6</sup> 5 and 6 classes is an acceptable range.

### Results.

This level of data is prepared for all vegetation projects that occur in suitable goshawk. Because the goshawk management recommendations are implemented in all projects that manipulate goshawk habitat connectivity is adequate.

### Interpretation.

**Is further evaluation needed?** Collection of these data is important to managing the more mature VSS classes for goshawks and their prey on the Forest. Because these data are important to this species, collection and evaluation is important to species persistence. Based on data collected at the project specific level including VSS class distribution and old growth, connectivity of VSS 5 and 6 is connected to support viable goshawk numbers as demonstrated above.

**Conclusion.** Based on data collected at the project specific level including VSS class distribution and old growth, connectivity of VSS 5 and 6 is connected to support viable goshawk numbers as demonstrated above.

### Monitoring Resources Available.

Project level data collection on VSS distribution and old growth delineation.

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<sup>6</sup> VSS = Vegetative Structural Stages as defined in Reynolds et al. 1992.

### Recommendation.

Continue to identify VSS distribution data and map existing old growth habitat by project area or landscape level analysis area. Display these areas on a map use these data to identify connectivity of VSS classes, and use these data to identify vegetation management opportunities as we look to manage VSS distributions.

### P. Snag Habitat

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Is snag habitat (i.e., number and size of snags) being maintained desired spatial arrangement?	Snag densities and sizes within a 100-acre block treated by mechanical or wildland fire use.	N/A	75% of more of the blocks measured meet guideline requirements is the acceptable range.

See J. Snag Management, on page 8-75, above.

### Q. Down Woody Material

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are down woody material and logs being maintained in sufficient amounts, sizes and spatial locations?	Down log and woody debris amounts and sizes within a 10-acre block treated by mechanical or wildland fire use. Measure 5% of more of the acres treated within a project area, within 2 years following completion of the vegetative treatment. Five-year reporting.	NA	Less than 75% of the blocks measured meet guideline requirements.

### Methods.

Collection of down log and woody debris amounts and sizes within a 10-acre blocks treated by mechanical or wildland fire use.

### Variation.

Seventy-five percent or more of the acres treated within a project area meeting guidelines, within 2 years following completion of the vegetative treatment, is the acceptable range.

## Results.

Stand exam data coupled with Brown's transects is generally collected prior to projects being analyzed. These data are loaded into FS-VEG database and used in the analysis process and when needed. Because the Dixie vegetation management program has been primarily bug killed salvage projects meeting the down woody debris has not been a lacking resource in spruce/fir areas. Area of ponderosa pine have been lacking in down woody debris.

## Interpretation.

**Is further evaluation needed?** Further data analysis and mapping is needed.

**What are the implications?** Down woody material and log data is being collected at the project specific level. Although further analysis and mapping should occur the Forest is not lacking in down wood in past or current vegetation management project areas. Mapping will assist the unit in calculating the impacts of wildland fire on the resource.

**Conclusion.** Down woody material and log data is being collected at the project specific level. Further analysis and mapping will continue on the forest. Down woody debris is lacking in areas where prescribed/wildland fire has had an impact of maintaining minimal amounts of this resource. Mapping will assist the unit in calculating the impacts of wildland fire on the resource.

## Monitoring Resources Available.

Stand exam data combined with Brown's transects data contained in project record files.

## Recommendation.

Include Brown's collection in all stand exam data collection, and record results in a table and map.

## R. Goshawk Habitat – Grazing Adjustments

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Are appropriate adjustments made to grazing practices in identified "at-risk" locations where grazing is contributing to the "at-risk" condition?	Ungulate grazing practices (i.e., utilization, season of use, grazing system) in identified "at-risk" locations. Review grazing practices annually on at least 2 allotments where "at-risk" conditions have been identified; five-year reporting.	NA	Grass, forb, and shrub production objectives are outside the range identified in landscape assessments.

**Methods.**

Ungulate grazing practices (i.e., utilization, season of use, grazing system) in identified “at-risk” locations. Review grazing practices annually on at least 2 allotments where “at-risk” conditions have been identified.

**Variation.**

Grass, forb, and shrub production objectives are within the range identified in landscape assessments is the acceptable range.

**Results.**

No “at risk” locations have been identified on the Forest.

**Interpretation.**

**Is further evaluation needed?** No. No “at risk” locations have been identified on the Forest, and until this happens further evaluation is not necessary.

**What are the implications?** At risk allotments are not known, and therefore, no adjustments to grazing practices in at risk allotments are needed.

**Conclusion.** At risk allotments are not known, and therefore, no adjustments to grazing practices in at risk allotments are needed..

**Monitoring Resources Available.**

During goshawk nest monitoring general conditions of the territory are observed. Through this process no at risk allotments have been identified.

**Recommendation.**

Continue to review general range conditions while conducting territory occupancy monitoring and identify “at risk” allotments if needed. If areas are identified these areas will be scheduled for further evaluation and recommendations will be developed.



## SECTION 9. RANGE

### A. Range Vegetation Condition and Trend

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Range Vegetation Condition and Trend	Measurement of plant composition and vigor, ground cover and soil stability. Monitoring and reporting frequency as per approved allotment management plan <sup>7</sup> .	M/M	Downward vegetation and/or soil trend.

#### Methods.

365 sites were visited in 2014 using the following reference methods:

- FSH 2209.21 – Rangeland Ecosystem Analysis and Monitoring Handbook – Chapter 40 – Rangeland Trend Monitoring (R4 Amendment 2209.21-2005-2 : Effective Date 12/23/2005)
- Chapter 20 – Rangeland Analysis (R4 Amendment 2209.21-2005-2: Effective Date 12/23/2005).
- Chapter 20 – Rangeland Analysis (Dixie NF Supplement No: 2209.21-2010-1: Effective Date: February 25, 2010) - Amends effective ground cover guidelines for the Dixie NF.
- Ocular Macroplot: USDA Forest Service Ocular Macroplot Field Guide (September 2008)
- With additional clarification provided in: Terrestrial Ecological Unit Inventory (TEUI) Guide (USDA, Forest Service General Technical Report WO-68).
- General Technical Report RMRS-GTR-47 “Monitoring the Vegetation Resources in Riparian Areas” by Alma H. Winward, April 2000.
- Additional clarification for riparian studies was adapted from General Technical Report RMRS-GTR-121 “Guide to Effective Monitoring of Aquatic and Riparian Resources – Part III: Effectiveness Monitoring for Streams and Riparian Areas within the Upper Columbia River Basin: Sampling Protocol for Integrator Reaches Vegetation Parameters” by Marc Coles-Ritchie and Richard C. Henderson, March 2004.

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<sup>7</sup> See discussion under “Methods” for update on methods and frequency.

- Additional clarification for riparian studies and species' ecological status and stream bank stability ratings were adapted from Idaho Technical Bulletin No. 2005-02 "Monitoring Stream banks and Riparian Vegetation – Multiple Indicators" by Ervin R. Cowley and Timothy A. Burton, September 2005.

## **Variation.**

Variation that would cause further evaluation and/or change in management direction would be a "downward vegetation and/or soil trend".

## **Results.**

During 2014, 365 long-term trend monitoring studies were completed on the Dixie National Forest. 250 were upland range trend monitoring studies, 78 were Level III Riparian Inventories, and 37 were photo points completed by Forest personnel.

These monitoring studies were performed in 61 allotments across the Dixie National Forest. This work was accomplished by the Forest Vegetation Monitoring Crew. People on this crew included Mark Madsen (Forest Botanist), and Jeff Curtis (Biological Science Technician). These monitoring studies were accomplished during the 2014 field season from March 25 – October 31.

229 of 250 FS upland range trend monitoring sites (92%) were replicated studies from which accurate trend data can be derived. 41 of 78 of the FS Level III Riparian Inventories (53%) were replicated and have accurate trend available. All of the 37 FS photo points (100%) were replicated and have accurate trend available.

Of the 229 replicated upland range trend monitoring studies, the data analysis on 43 of them (19%) indicate a downward trend in vegetation condition, effective ground cover, and/or frequency of invasives. The other 186 sites (81%) demonstrated stable or upward trends. Only 9 of the 43 monitoring sites (21%) that indicate downward trends are located in areas of the Dixie National Forest that have burned (wildfire or prescribed fire) or been mechanically treated within the past ten years. These burned and mechanical treatment areas are highly susceptible to cheatgrass invasion and low effective ground covers resulting from reduced fuel loads. There are a total of 5 of 229 sites (2% of all upland trend studies re-read in 2014) where downward trends may be a result of mechanical or prescribed burn project-level management activities not influenced by uncontrolled wildfire. These 5 monitoring sites are located on 5 pastures of the Cedar City and Powell Ranger Districts. In summary, 39 monitoring sites of 229 (17% of all upland trend studies re-read in 2014) exhibited downward trends that may be a result of any management activity not influenced by uncontrolled wildfire. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them.

Of the 41 replicated Level III Riparian Inventories, the data analysis on 8 of them (20%) indicate a downward trend in vegetative successional status, bank stability, and/or effective ground cover. These occur on 8 pastures of the Pine Valley, Cedar City, Powell, Escalante, and Teasdale Ranger Districts. Only one of these 8 monitoring locations was impacted by wildfire. Further evaluation of the other 7 sites may be warranted to determine if a change in management direction is needed and able to improve them. A total of 33 of the replicated

Level III Riparian Inventories (80%) demonstrate a stable or upward trend since they were last read in 2009.

Of the 37 replicated photopoints, the photo interpretive analysis on one of them (3%) indicate a downward trend in effective ground cover and/or soil stability. This site occurs on the Powell Ranger District. This site was indirectly impacted (post-fire flood effects) from the Bridge Hollow wildfire. A total of 36 of the replicated photo points (97%) demonstrate a stable or upward trend since they were last read in 2009.

In 1986, the Forest Plan did not define vegetation, ground cover, and soil stability conditions that would serve as a baseline from which to measure. Therefore, there are no reference conditions (from 1986) from which to measure trend. Since there is no baseline, sole reliance is placed on measuring trend during a defined time frame, from one long-term trend study reading to another. Therefore, using trend as variation that would cause further evaluation would be appropriate. Of the 365 monitoring studies and photo points reported here, 307 (84%) had previously established baseline studies using current methodologies where accurate trend data or photo interpretation could be derived. Other study sites may have previous readings, but this data was collected using various methods which are not compatible with current measurements and/or locations and photos could not be replicated. In the absence of periodically recorded post-1986 data, we cannot project a clear picture of how much the range has improved or declined over 1986 levels on the Dixie National Forest. However, current trend re-read from 2009 does give a clear picture of trend on the Forest between that time period and 2014. Of the 307 sites re-read and evaluated in 2014, 52 (17%) exhibited downward trends since these sites were last read in 2009.

The Forest has established a long-term monitoring program, as indicated by the number of studies re-read or established during 2014 and in previous years (753 FS upland range trend monitoring studies, 318 Riparian Level III Inventories, and 198 photo points from 2004-2014). Over time, these studies will be repeated and trend data will become available. This data is stored in a retrievable database where it can be accessed and additional repeat studies can also be stored and compared.

### **Interpretation.**

**Is further evaluation needed?** Yes, downward range vegetation condition and trends are apparent 17% of the plots re-read on Dixie National Forest in 2014.

For upland sites re-read in 2014, 39 monitoring sites of 229 upland sites (17% of all upland trend studies re-read in 2014) exhibited downward trends that may be a result of any management activity not influenced by uncontrolled wildfire. Further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them.

Of the 41 replicated Level III Riparian Inventories, the data analysis on 8 of them (20%) indicate a downward trend in vegetative successional status, bank stability, and/or effective ground cover. Only one of these 8 monitoring locations was impacted by wildfire. Further evaluation of the other 7 sites may be warranted to determine if a change in management direction is needed and able to improve them.

Of the 37 replicated photopoints, the photo interpretive analysis on one of them (3%) indicate a downward trend in effective ground cover and/or soil stability. This site was indirectly

impacted (post-fire flood effects) from wildfire. No further evaluation of this site is recommended at this time.

**What are the implications?** 17% of the plots re-read on Dixie National Forest in 2014 are exhibiting downward range vegetation condition and trends. On these sites, this may lead to reduced soil cover resulting in a loss of soil and a change in plant composition.

**Conclusion.** Areas in downward upland and riparian range condition trend are sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determines that these areas are able to be improved through permit action, then an adjustment in the AOIs for each site affected should be made.

#### **Monitoring Resources Available.**

Yes. This monitoring is the responsibility of the Dixie NF Botanist and long-term vegetation monitoring crew.

#### **Recommendation.**

Continue to monitor range vegetation condition and trend annually.

### **B. Forage and Grazing Utilization**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Forage utilization	Grazing impact studies by standard Forest Service methods. Reporting and monitoring frequency as per approved allotment management plan	M/M	Exceed prescribed utilization by 20% one time or 10% consistently.

#### **Methods.**

The 1986 measurement frequency requirement was “as per direction in approved AMPs”. The Forest Plan monitoring method is “grazing impact studies by standard Forest Service methods”. In 1992, the methodology was changed to “utilization studies”. Utilization (percent of forage removed) was retained for measuring use in uplands as well as browse species in both uplands and riparian areas.

#### **Variation.**

Exceed prescribed utilization by 20% one time or 10% consistently.

#### **Results.**

During the 2014 fiscal year, 56 of the 76 active allotments (80%) were reported to have been monitored for compliance with forest forage utilization standards. A total of 137 pastures were monitored within the 56 allotments. Of the 137 pastures monitored, 111 (81%) were in compliance with the forest plan standards and guides. There were a total of 222 key areas monitored for compliance; 104 (47%) were in riparian areas and 118 (53%) were in upland

sites. Compliance occurred in 76% of the riparian monitoring sites and in 88% of the upland locations. Stubble height, height/weight method, key species method, ocular reconnaissance, bank alteration and photo documentation were the primary methods used for assessing utilization compliance.

Of the nine allotments monitored on the Pine Valley Ranger District, two had pastures that did not meet standards. Riparian utilization standards were exceeded by more than 20% in the Burgess Pasture in the Burgess Allotment and by more than 10% in the Cove Mountain Pasture on the West Pinto Allotment.

Of the 22 allotments on the Cedar City Ranger District monitored for compliance, three had pastures that did not meet standards. Riparian utilization standards were exceeded by 20% or more in the Three Mile Riparian Pasture and Corral Hollow Pasture on the Little Valleys Allotment and in the Williamson Pasture on the Red Creek Allotment; and by more than 10% in the Blow-up Pasture on the Red Creek Allotment and Three Creeks Pasture on the Three Creeks Allotment.

Of the 11 allotments monitored on the Powell Ranger District, one allotment, Robinson/Lower Blubber, had a pasture that did not meet standard. Riparian utilization standards were exceeded by more than 20% in the Lower Blubber Pasture.

Of the 13 allotments monitored on the Escalante Ranger District seven allotments had pastures that exceeded utilization standards. Pastures that exceeded upland utilization standards by less than 10% were:

- Pacer (Coyote Hollow Allotment)
- Holby Bottom (North Creek Allotment)
- North Creek (North Creek Allotment)
- Pine Creek/Roger Creek (Pine Creek Allotment)
- Sand Creek (Sand Creek Allotment)

Pastures that exceeded upland utilization standards by more than 10% were:

- Sweetwater (Sand Creek Allotment)
- Roundy/Davis Flat (Pine Creek Allotment)
- Main Canyon (North Creek Allotment)
- Deer Lake (Boulder Allotment)

Upland utilization standards were exceeded by more than 20% on the Between-the-creeks Pasture on the Boulder Allotment.

Riparian utilization standards were exceeded by more than 10% on the Canaan Pasture on the Canaan Mountain Allotment.

Pastures that exceeded riparian utilization standards by more than 20% were:

- Deer Lake (Boulder Allotment)
- Big Swale/Clayton (Coyote Allotment)
- Pollywog (Coyote Allotment)
- Main Canyon (North Creek Allotment)
- Posey Lake (Pine Creek Allotment)
- Bear Creek (Sand Creek Allotment)
- Sweetwater (Sand Creek Allotment)
- Upper Valley Spring (Upper Valley Spring Allotment)

Based on the monitoring results for fiscal year 2014 and the Dixie NF Land and Resource Management Plan, management on the following pastures/allotments needs to be evaluated and/or changed due to the fact that utilization standards were exceeded by 20% in one year or 10% in consecutive years (LRMP V-6):

- Pine Valley Ranger District
  - Burgess Pasture (Burgess Allotment)
- Cedar City Ranger District
  - Three Mile Riparian Pasture (Little Valleys Allotment)
  - Corral Hollow Pasture (Little Valleys Allotment)
  - Williamson Pasture (Red Creek Allotment)
- Powell Ranger District
  - Lower Blubber Pasture (Robinson/Lower Blubber Allotment)
- Escalante Ranger District
  - Between-the-Creeks Pasture (Boulder Allotment)
  - Deer Lake (Boulder Allotment)
  - Big Swale/Clayton (Coyote Allotment)
  - Pollywog (Coyote Allotment)
  - Main Canyon (North Creek Allotment)
  - Posey Lake (Pine Creek Allotment)
  - Bear Creek (Sand Creek Allotment)
  - Sweetwater (Sand Creek Allotment)
  - Upper Valley Spring (Upper Valley Spring Allotment)

## **Interpretation.**

**Is further evaluation needed?** Further evaluation is needed in the pastures that have utilization standards that were exceeded by more than 20% in the current year or by 10% in consecutive years.

**What are the implications?** General satisfactory rangeland conditions indicate that stocking levels are fairly consistent with established capacities. However, some areas may be used to excessive levels. In most cases, this is a management problem rather than a capacity problem. Most often the excess use occurs because livestock enter an area too early because of poorly maintained fences; stay too long because permittees fail to make a complete gather, or return after being removed because of poorly maintained fences.

**Conclusion.** There are no indications that, at a landscape scale, livestock stocking rates are consistently 10% or more in excess of prescribed utilization levels, which would require further evaluation and/or change in management direction.

## **Monitoring Resources Available.**

In the past 20 years, inflation, static range budgets, and escalation in support and overhead costs, coupled with ever-increasing legal and environmental documentation requirements, have continued to erode away the Forest's ability to provide efficient and effective administration of livestock grazing and rangeland resources. The direct result of insufficient staffing is a lack of accomplishment in all facets of the range program. For the last several years, program emphasis has been placed on permit administration as the number one priority.

## **Recommendation.**

Continue monitoring.

## **C. Wild Horse Numbers and Trend**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Wild Horse Numbers and Habitat Trends	Annual aerial horse counts, grazing impact studies, habitat assessment as per allotment management plans; annual reporting.	M/M	Horse numbers deviate by 10% or range trend is down.

## **Methods.**

Annual aerial horse counts.

## **Variation.**

Horse numbers deviate by 10% or range trend is down.

## **Results.**

The North Hills Wild Horse Territory (WHT) and Herd Management Area (HMA) management plan, dated May 1977, charges the Forest Service and the Bureau of Land Management (BLM) to jointly manage the WHT/HMA at 40-60 horses. This area is approximately 71,000 acres, comprised of 50% Bureau of Land Management, 35% the Forest, 8% State land, and 7% Private.

A population census was conducted in May 2104 with 136 adults and 17 foals counted. In addition there is a satellite herd of about 25-30 horses located outside of the North Hills Territory. Overall the wild horse numbers are about 300% over appropriate management level (AML) for the North Hills Territory.

Five long-term monitoring sites are in the territory; two locations were rated as not-functioning, two rated as functioning-at-risk, and the final as functioning. Causes for functioning-at-risk and non-functioning were due to high presence of cheatgrass and low ground cover.

## **Interpretation.**

**Is further evaluation needed?** Yes, aerial counts indicate that populations fluctuate more than 10% annually and that the herd number greatly exceeds the AML. Past monitoring has indicated that there are wide fluctuations in population numbers because of annual mortality and foal survival. Reproductive rates vary between 15% and 20%. Utilization levels are being exceeded and rangeland conditions are not improving.

**What are the implications?** Until the herd size is brought within the 40-60 AML range conditions will continue to deteriorate. Likewise, health and welfare of the horses will be put at risk during drought conditions.

**Conclusion.** Monitoring indicates a change in management direction is needed.

## **Monitoring Resources Available.**

The Forest is in a cooperative program with BLM to achieve this monitoring.

## **Recommendation.**

Coordination with the BLM to develop and implement a wild horse management plan is needed.

The additional 25-30 horses located in areas outside the WHT/HMA should be removed and relocated back to the North Hills Territory.



## SECTION 10. TIMBER

### A. Timber Harvest Area

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Timber Harvest Area	Semi-annual review and reporting of timber program to ensure that harvest area will not exceed 10-year estimate by more than 10%	H/M	Planned harvest area exceeded by more than 10% in any given year.

#### Methods.

Evaluation of timber harvest areas.

#### Variation.

Harvest areas exceed more than 10% in any given year. The Forest Plan projected average is 10,525 acres per year.

#### Results.

Acres harvested are monitored annually and compared with the Forest Plan projected average of 10,525 acres per year. An average of 3,182 acres was in timber sales sold from 1987 to 2014. Individual year's data are shown below. The forest has harvested over 1,000 acres only twice in the last thirteen year.

**Acres in timber sales sold and harvested from 1987 to 2014 on the Dixie National Forest.**

Year	Total Acres in Sales Sold 1987-2014	Total Acres Harvested in Sales Sold in 1987-2014
1987	5,656	84
1988	5,369	2,946
1989	7,193	3,590
1990	5,184	7,454
1991	7,403	5,029
1992	2,907	6,629
1993	4,366	4,962
1994	2,044	3,807
1995	822	1,411
1996	11,762	4,068
1997	5,131	6,600
1998	4,092	3,743
1999	2,695	3,332
2000	1,553	6,196
2001	536	1,173
2002	804	990
2003	449	856
2004	2,266	144
2005	1,500	539

Year	Total Acres in Sales Sold 1987-2014	Total Acres Harvested in Sales Sold in 1987-2014
2006	230	723
2007	4,604	1,354
2008	1,191	1,124
2009	616	318
2010	709	200
2011	3,806	885
2012	2,009	295
2013	2,485	550
2014	1,725	617

### Interpretation.

**Is further evaluation needed?** No, harvested acres have not exceeded the projected decadal average stated in the Forest Plan.

**What are the implications?** Impacts from timber harvest and outputs are less than projected in the Forest Plan.

**Conclusion.** There is no variation that would cause further evaluation and/or change in management direction.

### Monitoring Resources Available.

The sold and harvest acres are taken from the Timber Information Manager (TIM), Forest Service Activity Tracking System (FACTS), and Cut and Sold Report from TSA.

### Recommendation.

Continue monitoring volume and acres as harvested.

The Forest Plan states the monitoring method as, "Review of timber program to ensure that harvest area will not exceed 10-year estimate by more than 10%". The variation causing further evaluation and/or change in management direction is, "Planned harvest area exceeded by more than 10% in any given year". These two measures are not consistent: one states a 10-year estimate and the other is in any given year. Monitoring changes are needed to make these items consistent.

## B. Timber Research Needs

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Timber Research Needs	Annually document and report recurring or unusual problems	M/M	Inability to solve problems though existing technology or practices.

### Methods.

#### Englemann spruce beetles

Long term monitoring for spruce beetles (*Dendroctonus rufipennis*) continues across the forest and specifically on the Griffin Top area of the Aquarius Plateau on the Escalante

Ranger District. These studies are designed to determine infestation levels in uninfested harvested and non-harvested areas. These studies are conducted by the Dixie National Forest and the Forest Service Region 4 Forest Pest Management (FPM) office.

#### Root disease

Also, the Forest, in conjunction with FPM, has been looking at timber harvest and slash treatment methods to control the spread of Tomentosus root rot (*Inonotus tomentosus*) in Engelmann spruce and blue spruce. This disease has been detected by pathologists in several stands of blue spruce on the Aquarius Plateau.

#### Aspen Management

Many recent vegetation management projects on the Forest have focused at least some treatments on the regeneration and improvement of aspen. While treatment objectives are generally focused on the seral state of aspen, and the need to improve or maintain aspen dominated stands, there have been reports of aspen decline across the Forest, which may result in the permanent loss of some aspen clones (Guyon et al. 2012). Recent service trips by Forest Health Protection scientists to the Reed Valley and Navajo project areas of the Cedar City Ranger District, indicate that aspen decline is present in some stands and needs to be addressed when prescribing treatments.

#### Ips beetle

In December of 2010, a wind event caused many ponderosa pine trees to be, uprooted, broken, and downed on the Cedar City Ranger District. A recent service trip by FHP scientists indicate that these trees are now infested with *Ips Pini*, and since Ips can infest the tops of adjacent healthy trees there a concern with the amount of down material in the affected area (Guyon et al. 2012).

### **Variation.**

Inability to solve problems though existing technology or practices.

### **Results.**

Research is ongoing. For long term monitoring of spruce beetles on the Griffin Top, studies are indicating that while spruce beetle caused mortality has decreased on the Plateau, many stands are still at high to moderate susceptibility, and are of concern because spruce beetles are capable of long distance dispersal, and with the general depletion of host resources on Griffin Top, populations may begin to spread north and east (Hebertson 2010). One conclusion so far is that, prevention strategies including silvicultural treatments, such as thinning and group selection offer the greatest chance of reducing long-term susceptibility to spruce beetle infestation because they increase diversity of species and structure across the landscape. If silvicultural treatments are used, they must occur while spruce beetle populations are at low levels to maximize their effectiveness (Hebertson 2010). Spruce beetle monitoring will continue in this area.

Treatment options for dealing with Tomentosus root rot spread, are the result of a study in the Row Lakes area, adjacent to the Escalante Ranger District. Although only blue spruce trees were infected, this root disease is known to infect all spruce species throughout south-central

Utah. Harvesting, particularly partial cutting, could intensify the root disease and potentially affect residual spruce or spruce regeneration. Recommendations are to minimize partial cutting in those portions of stands where *Tomentosus* root disease is prevalent or favor disease tolerant species such as aspen or Douglas-fir where possible (Hebertson 2010).

Recommendations for aspen treatments in stands experiencing decline and little regeneration are to focus on removing all aspen overstory trees, and competing vegetation, to give these stands the best chance for aspen survival (Guyon et al. 2012). Protection of regeneration by fencing may also be necessary.

Recommendations for dealing with potential Ips beetle effects in the Cedar City RD area are to remove any infested material, when beetle populations are at their highest. There is a need to monitor this the next season to see if there are any new infestations in the area.

### **Interpretation.**

**Is further evaluation needed?** Research is ongoing, monitoring will continue. The Forest will continue to work with R4 FHP scientists to monitor all of these issues.

**What are the implications?** So far this has resulted in prioritizing treatments in Englemann spruce stands that are at moderate to high susceptibility of beetle infestation. Also, the results will focus treatments, where applicable, to control the spread of *Tomentosus* root rot. The presence of aspen decline in some areas of the Forest, has not necessarily resulted in reprioritizing stands for treatment, but is an important consideration in how the treatment is prescribed in aspen stands affected by this. The presence of *Ips pini* has resulted in consideration of this area for planning for treatment, but implementation of the recommendations was not completed in 2013.

**Conclusion.** There is no variation that would cause further evaluation and/or change in management direction at this time.

### **Monitoring Resources Available.**

Research Stations and Forest Pest Management conduct research projects.

### **Recommendation.**

Continue to use research to study Forest problem.

The wording in the variation is out of place and should be changed to read “Inability to solve problems through existing technology or practices”.

### **Citations.**

Hebertson, L. 2010. FHP Functional Assistance Visit to the East Zone of the Dixie National Forest, OFO-TR-10-16, 2010.

Guyon, J., 2012. Evaluation of Western Bark Beetle Projects on the Cedar City Ranger District, Dixie National Forest.

## C. Suitable and Unsuitable Land Classifications

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Verify Classification of Suitable and Unsuitable lands	Examine lands during silvicultural exams, timber inventories, and ID team reviews to ground truth capabilities on a project basis; report annually.	H/H	10% of land area found to be incorrectly identified.
	On a project basis as available, but prior to Plan update, complete soil/geologic survey of lands identified as unsuitable because of potential irreversible resource damage by 1990; report every 5 years.	M/H	

### Methods.

A process was developed to verify suitability during timber sale project planning, and to accomplish the classification on the earlier sales made since 1986.

### Variation.

10% of land area found to be incorrectly identified. The Forest Plan identified 300,100 acres of suitable forest land.

### Results.

The table below displays the number of timber sales and total acres verified for timber suitability. The total forest acres verified for suitability equals 269,035.

**Number of timber sales and acres verified for timber suitability from 1987 to 2014.**

District	Number of Sales	Total Acres Verified
Cedar City	44	119,964
Escalante	23	95,362
Powell	6	28,204
Teasdale	14	25,505
TOTAL	87	269,305

### Interpretation.

**Is further evaluation needed?** Data are not available to determine. Project level suitability classification is progressing. The acres verified are less than was identified in the Forest Plan as suitable forest land. Suitability classification has not been completed forest wide.

**What are the implications?** A comparison with the suitability classification shown in the Forest Plan will not be possible until the classification program is completed. The resulting classification data will be used in the revision of the Forest Plan.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction has been identified at this time.

**Monitoring Resources Available.**

District personnel are conducting the project-level suitability classification on a project-by-project basis.

**Recommendation.**

Continue project-level classification process.

**D. Harvest Practices in Retention/Partial Retention**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Harvest Practices in Retention, Partial Retention, and Riparian Areas	Review of silvicultural prescriptions for timber sales and post-sale stand exams on a project basis; report annually.	M/H	Violation of Visual Quality Objectives or riparian area damage.

**Methods.**

Evaluation of harvest practices in retention, partial retention, and riparian areas.

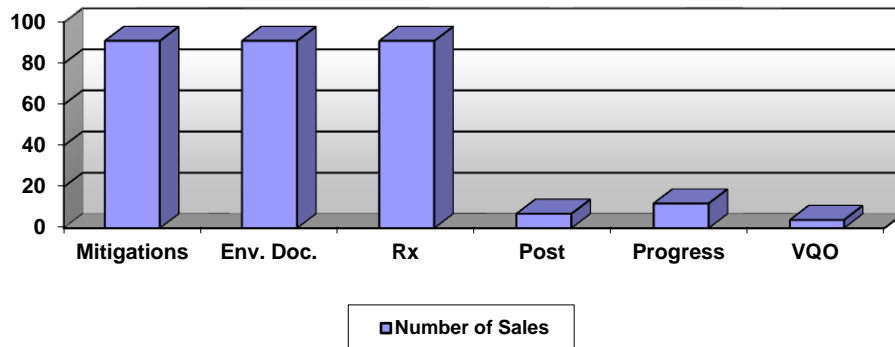
**Variation.**

Violation of Visual Quality Objectives (VQOs) or riparian area damage.

**Results.**

Of 156 timber sales planned and implemented from 1987 to 2014, 65 had no mitigations identified in the landscape architect report. Of the remaining 91 sales for which mitigations were recommended, all contained the mitigations in the environmental document and in the silvicultural prescription. Of these sales, seven have documentation of post sale monitoring completed by a landscape architect, and twelve sales are still in progress. The remaining 72 sales have no documentation of post sale monitoring. On three sales the Visual Quality Objectives (VQOs) were not met in the first Forest Plan decade (1987-1998) because bark beetle suppression objectives took priority over full accomplishment of visual quality objectives. Post harvest monitoring has not been occurring or documented since 2006.

Number of sales on the Dixie National Forest that contained mitigations recommended in the landscape architect report (“mitigations”), mitigations in the Environmental Document (“Env. Doc.”), in the silvicultural prescription (Rx), documented post-sale monitoring (“Post”), sales still in progress (“Progress”), and where Visual Quality Objectives were documented as accomplished (“VQO”).



VQOs were documented as met on four completed sales (4 percent) of those with mitigation measures identified in the landscape architect report. There is no documentation to determine if VQOs were accomplished on the remaining 96 percent of the completed sales for which mitigation measures were identified.

### Interpretation.

**Is further evaluation needed?** Yes, mitigation measures necessary to reduce management impacts on the visual landscape were minimal for most silviculture prescriptions. The Forest Landscape Architect, sale preparation and marking crews, and sale administrator implemented some of the mitigations. Overall, visual quality standards in the Landscape Architect Report are being carried through the sale implementation process and accomplished on the ground.

**What are the implications?** Documentation is needed to determine if achieving Visual Quality Objectives is occurring.

**Conclusion.** Overall, specific visual protection measures are being documented in environmental analysis and silviculture prescriptions, and are documented in only a few sales through post sale monitoring, and none since 2006. There is a need for more consistent post-sale monitoring.

### Monitoring Resources Available.

The resources are available for planning, but do not appear to be available for post-sale monitoring.

### Recommendation.

Continue to monitor sales and improve the accuracy of the Landscape Management Reports. Change “Variation” standard to “Deviation from Scenic Integrity Objectives” (Forest Plan amendment). Update this monitoring to include use of Scenery Management System rather than Visual Quality Objectives.

## E. Adequate Restocking

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Adequate stocking of stands within a reasonable time period, generally 5 years of final harvest.	Silvicultural exam (Type 3), five years after final harvest; report annually.	H/H	Less than 5th year stocking standards in FSH 2409.26b—5.31-4.

### Methods.

Code of Federal Regulations 36 CFR 219.27(c)(3) states, “When trees are cut to achieve timber production objectives, the cuttings shall be made in such a way as to assure that the technology and knowledge exist to adequately restock the lands within five years after final harvest... Five years after final harvest means five years after clearcutting, five years after final overstory removal in shelterwood cutting, five years after the seed tree removal cut in seed tree cutting, or five years after selection cutting.”

### Variation.

Less than 5th year stocking standards in FSH 2409.26b—5.31-4.

### Results.

Acres in the various “Final Harvest” silvicultural treatments for sales made during 1987-2014 are shown below. Intermediate treatments such as commercial thinning, shelterwood preparatory cut and seed cut, initial seed tree cut, or sanitation and salvage are not included.

**Acres harvested with silvicultural treatments from 1987 to 2014 on the Dixie National Forest.**

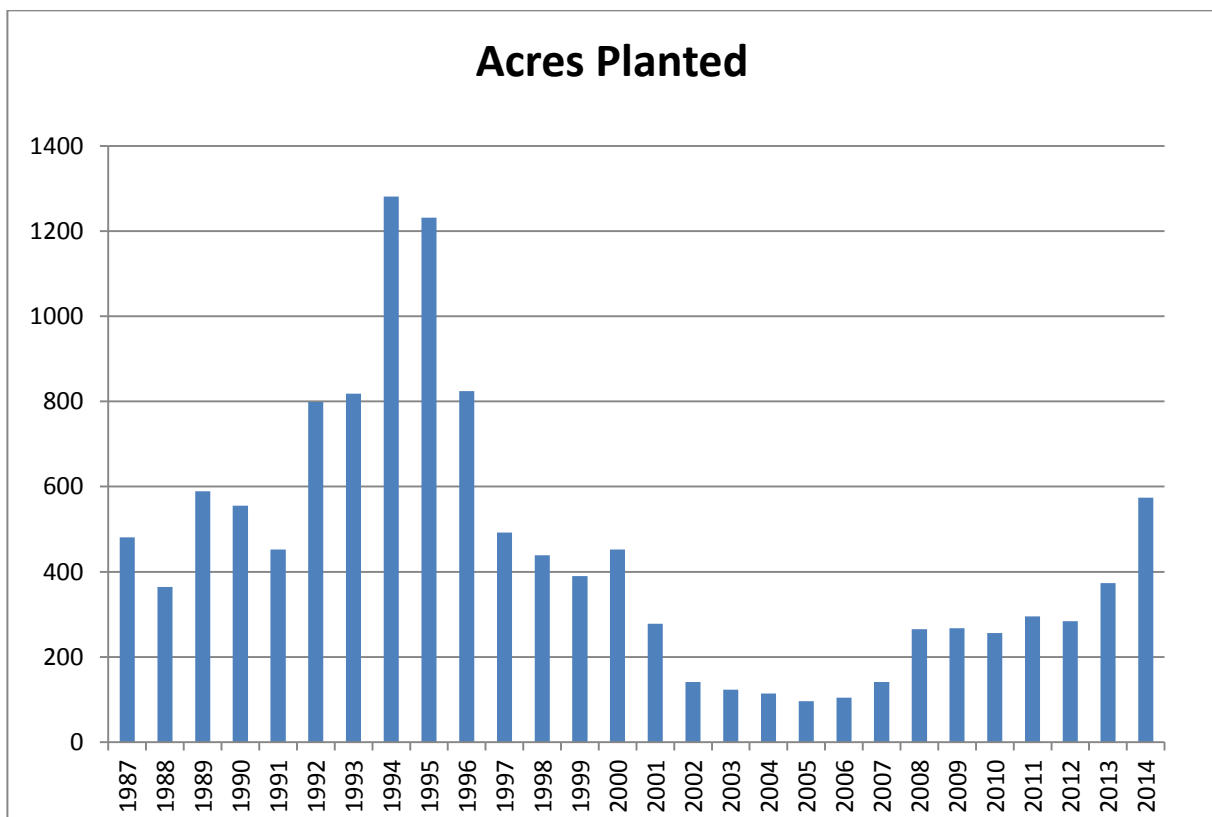
Year	Clearcutting	Final Overstory/ Shelterwood	Seed Tree Cutting	Selection Cutting	Total
1987	0	0	0	0	0
1988	0	0	0	0	0
1989	26	57	0	543	626
1990	0	251	0	433	684
1991	0	0	0	1642	1,642
1992	107	0	0	62	169
1993	14	1150	0	3392	4,556
1994	43	0	0	126	169
1995	34	0	0	0	34
1996	26	0	0	0	26
1997	0	0	0	0	0
1998	0	0	0	0	0
1999	148	0	0	175	323
2000	0	0	0	0	0
2001	0	0	0	0	0
2002	67	0	0	0	67
2003	97	0	0	0	97
2004	63	0	0	0	63



Year	Clearcutting	Final Overstory/ Shelterwood	Seed Tree Cutting	Selection Cutting	Total
2005	0	0	0	0	0
2006	190	0	0	0	190
2007	0	0	0	0	0
2008	110	0	0	243	110
2009	4	0	0	0	4
2010	36	0	0	0	36
2011	0	0	0	0	0
2012	39	0	0	0	39
2013	60	0	0	0	60
2014	230	0	0	0	230

The tables below provides the 1<sup>st</sup> and 3<sup>rd</sup> year survival records for artificial regeneration (planting) that has occurred between 1987-2014. Because some of these planted acres did not fall into the silvicultural treatment categories listed above, the acre totals will not match.

**Acres planted annually on the Dixie National Forest from 1987 to 2014.**



**First and third year survival records for regeneration between 1987 to 2014, and acres certified as stocked from 1992 to 2014.**

<b>Year Planted</b>	<b>Acres Planted</b>	<b>1<sup>st</sup> Year Survival</b>	<b>3<sup>rd</sup> Year Survival</b>	<b>Acres Certified</b>
1987	481	78%	64%	0
1988	364	95%	78%	0
1989	589	90%	65%	0
1990	555	96%	92%	0
1991	452	92%	70%	0
1992	799	82%	70%	3,154
1993	818	89%	66%	1,021
1994	1,281	71%	57%	1,189
1995	1,231	80%	45%	773
1996	823	33%	33%	673
1997	492	96%	88%	464
1998	438	86%	77%	633
1999	390	74%	74%	109
2000	452	95%	84%	571
2001	278	97%	NA	0
2002	141	44%	NA	0
2003	127	NA	NA	1,794
2004	114	NA	NA	802
2005	96	NA	NA	84
2006	104	NA	NA	1,808
2007	138	NA	NA	859
2008	265	NA	NA	178
2009	268	92%	80%	146
2010	256	92%	72%	0
2011	295	96%	55%	280
2012	284	70%	74%	0
2013	373	92%	74%	0
2014	572	93%	67%	209

Most areas that were harvested through a final harvest treatment prior to the adoption of the Forest Plan have regenerated to an adequate restocking level. Recent planting activities have been focused on restoration of Engelmann spruce from the bark beetle epidemic, which has destroyed much of the mature spruce on the Cedar City RD and Powell RD. Survival rates for recent spruce plantings have generally been above 90 percent, although plantings completed in 2012 had a slightly lower rate at about 80 percent, likely due to more droughty conditions during the summer. Third year surveys for past spruce plantings are indicating survival rates at 70 percent, which was true for surveys completed in 2012. Spruce restoration has been highly successful where seedlings are established and containerized stock is used.

The Forest has recently been planting ponderosa pine in burned over areas that are in need of reforestation, mostly on the Escalante RD. These planted areas have occurred on a variety of sites including some that are on harsh sites that were severely burned. Survival rates have generally been very good in ponderosa pine with survival rates greater than 90 percent for the 1<sup>st</sup> year. However, in 2012, surveys indicated that for trees planted in 2012 on the Bridge and Toad areas, survival was much lower than normal, with rates about 75% in the Bridge area,

while the Toad area had a failure with rates less than 20%, resulting in a need to plant this area again. The Toad area (35 acres) that failed was replanted in 2014, with very good success and 91% survival. Reasons can be traced back to droughty conditions in 2012 that there were little to no summer rains in these areas, the spring of 2014 was much wetter and resulted in much more favorable conditions for planting. Installation of vexar tubing to protect seedlings from browsing continues in these areas and recommend for future.

Climate continues to be a challenge to seedling establishment. Drought has continued to affect survival of young trees; however, the use of containerized seedlings has improved seedling survival, especially on basaltic soils. Also, the use of microsites has improved survival rates. These high survival rates are encouraging and all of these planted areas should contain adequate stocking within five years.

There is a need to increase the forest's tree seed inventory, as collections of cones for Engelmann spruce have dramatically decreased with the high levels of mortality, but will need to be replenished as spruce is desired to be planted over many more acres. There is also a need to collect ponderosa pine seeds to reforest burned over sites as well as sustain ponderosa pine if there is a mountain pine beetle outbreak.

Overall, reforestation needs continue to be identified during vegetation management planning. All harvested areas have been and will continue to be adequately stocked. Planting will likely continue to be the method of reforestation in conifer stands, although natural regeneration will be encouraged where feasible. Natural regeneration will be the method of reforestation for aspen stands.

### **Interpretation.**

**Is further evaluation needed?** No. Though no five-year measurements have been made for treatments harvested since 1987, the 1<sup>st</sup> and 3<sup>rd</sup> year survival records provides for artificial regeneration (planting) that has occurred between 1987-2014.

**What are the implications?** Most areas that were harvested through a final harvest treatment prior to the adoption of the Forest Plan have regenerated to an adequate restocking level. However, some areas have not reached adequate stocking level. In these areas, work and evaluation will continue toward adequate restocking. The standards and guidelines implemented in the Forest Plan will be used to prevent these problems in the future.

**Conclusion.** Monitoring information for final harvest treatments implemented after the adoption of the Forest Plan have been available since 1992. This information will allow us to assess the effectiveness of the standards and guidelines and make additional adjustments, if necessary.

### **Monitoring Resources Available.**

Certified Silviculturists conduct monitoring to meet the Code of Federal Regulations.

### **Recommendation.**

Continue monitoring.

## F. Maximum Clearcut Opening Size

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Maximum size of openings created by clearcuttings	Annually report and review timber sale silvicultural prescriptions and post-sale silvicultural exams on a project basis.	H/H	Clearcut sizes either restrict timber harvest practices or adversely affect visuals or other resource values.

### Methods.

Evaluation of maximum size of openings created by clear-cutting.

### Variation.

Clearcut sizes either restrict timber harvest practices or adversely affect visuals or other resource values.

### Results.

A total of 1,746 acres were clearcut in various sales during 1987-2014 to meet objectives such as insect and disease control, and aspen regeneration. There have been no perceived or recorded adverse effects to harvest practices, visual quality, or other resources values because of the size or location of the clearcut.

### Interpretation.

**Is further evaluation needed?** No, the data indicate that clearcut sizes have not restricted timber harvest practices or adversely affected visuals or other resource values.

### What are the implications?

The use of clearcuts does not appear to result in adverse impacts.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction has been identified.

### Monitoring Resources Available.

Resources have been allocated for this monitoring.

### Recommendation.

Continue monitoring the impacts of clearcut size and effects on other resources. Forest Plan Amendment is recommended. It was proposed in the Spruce Ecosystem Recovery Project (SERP) Environmental Impact Statement, signed January 30, 1998, "When responding to catastrophic events, such as insect and disease, no opening size limitations will apply".

## G. Reforestation and TSI Accomplishment

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Reforestation and Timber Stand (TSI) improvement accomplishment.	Annually report and review TSI and reforestation needs and accomplishment reports, KV plans.	H/H	Failure to meet targets or accomplish KV needs in timber sale plans.

### Methods.

Evaluation of reforestation and timber stand (TSI) improvement accomplishment.

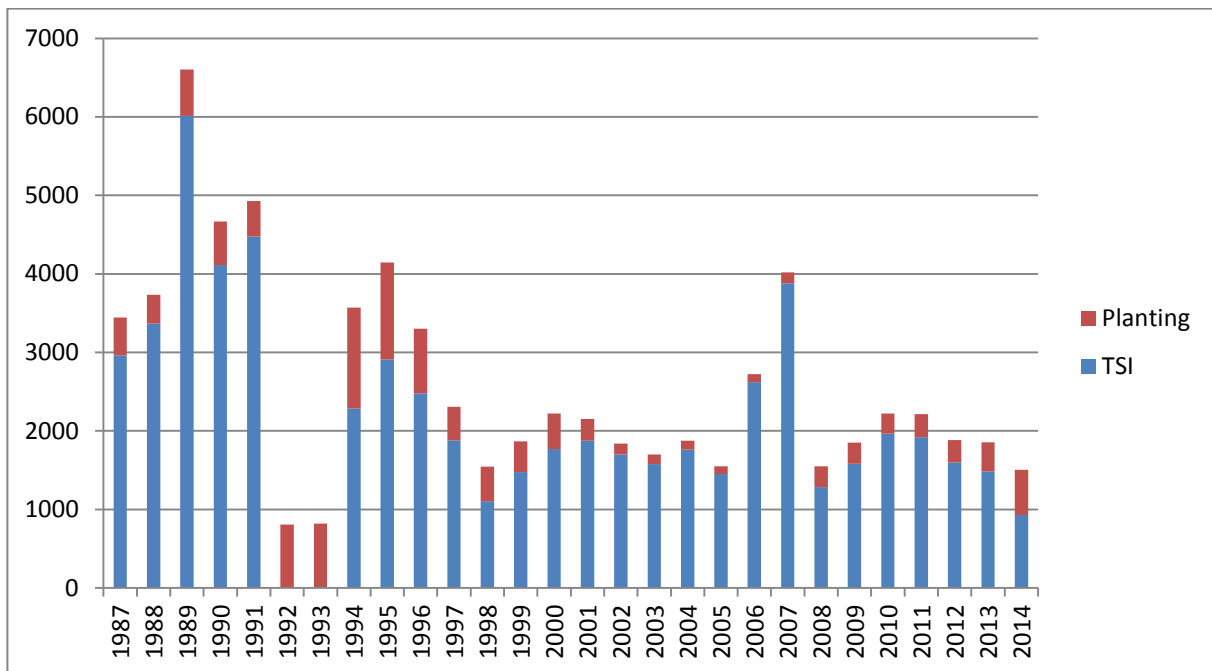
### Variation.

Failure to meet targets or accomplishments using funds under authority of the Knudsen Vandenburg Act (KV) needs in timber sale plans.

### Results.

The Forest Plan projected 5,000 acres per year in thinning and 1,588 acres per year in reforestation. The following acres have been reforested and thinned from 1987 to 2014.

**Acres thinned and reforested on the Dixie National Forest from 1987 to 2014. Thinning acres in blue and reforestation acres in red.**



### Interpretation.

**Is further evaluation needed?** No. Thinning and reforestation needs are assessed and identified during the site-specific timber sale project analysis, and are being accomplished as identified. Thinning/reforestation accomplishments to date have not met the projections of the Forest Plan. This is due to the decline in the timber harvest program and the

accomplishment of most thinning needs early in the monitoring period. Reforestation projections are expected to continue in conjunction with the bark beetle recovery projects in the spruce type and within fire areas needing reforestation.

**What are the implications?** Thinning and reforestation needs are assessed and identified during the site-specific timber sale project analysis, and are being accomplished as identified. Reforestation projections are expected to continue in conjunction with the bark beetle recovery projects in the spruce type and fire recovery projects in the pine type.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction has been identified.

#### **Monitoring Resources Available.**

Thinning targets are reported annually in the Forest Service Activity Tracking System (FACTS)

#### **Recommendation.**

Continue monitoring.

### **H. Fuelwood Consumption and Supply**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Fuelwood consumption and supply	Determine supply by fuels inventories and acres available; determine demand by monitoring permits issued and sampling actual removal on a project basis; annual reporting.	H/M	Supply is not meeting or projected to not meet demand within 5 years.

#### **Methods.**

Evaluation of fuelwood consumption and supply.

#### **Variation.**

Supply is not meeting or projected to not meet demand within five years.

#### **Results.**

Vegetative management practices on the Forest result in the availability of an estimated 14,000 cords of fuelwood annually. During the first five years (1986-1991) of the Plan period, an average of 7,446 cords of fuelwood was utilized each year. After natural gas was delivered to the major population centers in the area, the fuelwood consumption has declined to less than 5,000 cords per year and is currently on a declining trend. In the past ten years, the Forest has experienced catastrophic Engelmann spruce tree mortality due to a spruce beetle epidemic. This has resulted in thousands of acres of dead trees and heavy volumes/acre of fuel loading contributing to an increasing amount of fuelwood availability.

**Fuelwood (Cords) Permitted by Ranger District, 2007-2014**

<b>Fiscal Year</b>	<b>Pine Valley</b>	<b>Cedar City</b>	<b>Powell</b>	<b>Escalante</b>	<b>Total</b>
2007	765	2,128	897	516	4,306
2008	812	2,259	1,107	540	4,718
2009	732	2,410	1,172	478	4,792
2010	802	2,351	1,120	609	4,882
2011	871	2,374	1,148	729	5,122
2012	740	2,215	1,003	695	4,653
2013	714	2,053	1,041	577	4,385
2014	812	1,797	883	570	4,062

**Interpretation.**

**Is further evaluation needed?** No. Although localized fuelwood shortages may occur, primarily in the St. George area, the fuelwood supply appears to be able to meet the projected demand during planning time.

**What are the implications?** The importance of meeting demands for fuelwood may have changed since the Forest Plan was written.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction was identified.

**Monitoring Resources Available.**

Sales of fuelwood are recorded annually in the Timber Information Manager (TIM) system.

**Recommendation.**

Continue monitoring.

**I. Growth Responses**

<b>ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED</b>	<b>MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY</b>	<b>PRECISION/RELIABILITY</b>	<b>VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION</b>
Growth response of regenerated stands, precommercially thinned stands, and cutover sawtimber (including effects of insects and diseases).	Every 5 <sup>th</sup> year, stage II stand examinations, permanent growth plots; annual reporting.	H/H	± 10% variance in actual growth measured against assumptions made in growth simulations (PROGNOSIS)

**Methods.**

Stage II stand examinations and permanent growth plots. Four permanent growth plots were established in 1991, and one in 1990. Post harvest Stage II stand examinations were completed on stands on the Cedar City, Powell, and Teasdale Districts during 1991.

### **Variation.**

A 10% plus or minus variance in actual growth measured against assumptions made in growth simulations (PROGNOSIS) is the variation that would cause further evaluation and/or change in management direction. The Forest Plan projected potential growth (cubic feet/acre/year) to be 20 to 40 on 89,424 acres, and 50 to 84 on 241,776 acres.

### **Results.**

Four permanent growth plots were established in 1991, and one in 1990. Post-harvest Stage II stand examinations were completed on stands on the Cedar City, Powell, and Teasdale Districts during 1991.

A random sample of 581 trees measured in the 1980 Forest Inventory shows a diameter growth of 0.7 inches per 10 years in natural stands. Post-harvest growth studies conducted in managed stands during 1991 disclosed an average diameter growth of 1.6 inches per 10 years. Preliminary findings are that increased growth response is evident in sampled managed stands. Permanent growth plots have not been measured since 1991.

### **Interpretation.**

**Is further evaluation needed?** No. Although data presented were in inches per ten years rather than cubic feet/acre/year, growth responses to managed stands are positive.

**What are the implications?** Thinning was intended to promote wood growth. Since the Plan was written, emphasis is now on ecosystem health rather than growth for production.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction was identified.

### **Monitoring Resources Available.**

Monitoring of the recently established growth plots provided data for this Forest Plan requirement.

### **Recommendation.**

Continue monitoring. Revisit growth plots and re-measure.

## **J. Timber Supply Projections**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Timber supply projections.	Stage II stand examination to complete exam on remainder of commercial Forest land annually in an accelerated basis until completed. Work toward goal of 45,000 acres per year on a continuing basis; annual reporting.	H/H	± 10% variation in projections measured against Forest Plan projections.



	Stage I timber inventory by 1989 or sooner; reporting 5-years or before Forest Plan update.	H/H	
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## Methods.

Work was completed on a 10-year Forest timber inventory and vegetation classification. The vegetative classification portion of the timber inventory (using LANDSAT imagery) was initiated in 1991.

The Interior West Resource Inventory, Monitoring, and Evaluation (IWRIME) Program of the U.S. Forest Service, Intermountain Research Station, completed an extensive, comprehensive inventory of all forested lands in Utah in 1995, which included the Dixie National Forest. A two-phase sampling procedure was used. Phase 1 used a grid of sample points on maps and photos and Phase 2 was the field phase that involved measuring of sample points. Stand examinations have been completed on an average of 23,400 acres per year, and the data used in the evaluation of out-year sales.

## Variation.

A 10% plus or minus variation in projections measured against Forest Plan projections would cause further evaluation and/or change in management direction. Projections for timber supply productions are estimated as an annual average for the first decade equaling 24,700 MBF<sup>8</sup>/4,960 MCF<sup>9</sup> (Table II-24 on page II-29).

## Results.

The latest Forest inventory (1998 Inventory) shows the following results:

- Net volume of sawtimber (Scribner rule) on nonreserved timberland is 3,534,863 MBF/1,197,122 MCF
- Net annual growth (Scribner rule) of sawtimber trees on nonreserved timberland is 45,134 MBF/15,364 MCF
- Annual mortality of sawtimber (Scribner rule) on nonreserved timberland is 53,763 MBF/18,800 MCF

## Interpretation.

**Is further evaluation needed?** Not determined.

**What are the implications?** Stand examinations have not proven effective in determining forest-wide timber supply projections. Timber supply projections should be determined by the Forest-wide timber inventory.

**Conclusion.** Timber supply projections should be determined by the Forest-wide timber inventory.

## Monitoring Resources Available.

The latest Forest inventory in 1998 is the source used.

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<sup>8</sup> MBF = thousand board feet.

<sup>9</sup> MCF = thousand cubic feet.

**Recommendation.**

The monitoring requirement for Stage II stand exams should be modified or dropped and stand exams limited to use in timber sale project planning. Use the 10-year Forest-wide inventory and vegetation classification to determine timber supply.

## SECTION 11. SOILS

### A. Long-Term Soil Productivity

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Long-term soil productivity	Fabric dams, erosion pins, visual estimates, photo points, and/or other accepted methods on 2 locations per year; annual reporting.	H/M	Exceeding established soil loss tolerance levels.

#### Methods.

Recommendations are made on a project-by-project basis to ensure long-term soil productivity is maintained.

#### Variation.

The variation which would cause further evaluation and/or change in management direction is exceeding established soil loss tolerance levels.

#### Results.

Two sites were monitored in 2014:

Bridge and Deer Hollow Timber Sale Monitoring – Project design criteria were implemented and effective at minimizing surface erosion on skid trails and closed roads.

#### Interpretation.

**Is further evaluation needed?** Photos were taken of the closed roads and skid trails in the project areas. The design criteria of water barring the road, ripping, and closing it with rock was implemented; noticeable erosion (rills, rutting, and drainage establishment) was not observed. There did not appear to be as much vegetation growing on the old road prism as on the land adjacent to the closed road. Skid trails were well vegetated (primarily with grasses) and had noticeable amounts of coarse woody debris. No signs of noticeable erosion on the skid trails were observed.

**What are the implications?** None, the SWCPs were effective for these two timber sales.

**Conclusion.** We need to continue to monitor various projects associated with timber sales.

#### Monitoring Resources Available.

Project monitoring by District and Forest personnel has been available for soil resources.

#### Recommendation.

Continue monitoring.

## B. Soil Compaction

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compaction	Measurement of bulk density and/or pore space on 2 timber sales per year; report annually.	H/H	15% increase in bulk density or 50% decrease in pore space

### Methods.

Bulk density core sample analysis on the Bridge and Deer Hollow timber sales were monitored in 2014.

### Variation.

A 15% increase in bulk density or 50% decrease in pore space is the variation that would cause further evaluation and/or change in management direction.

### Results.

Compaction monitoring was completed on two timber sales in 2014.

Bridge Sale Monitoring – 67% of the skid trails in the analysis area were compacted by more than a 15% bulk density increase. The largest increase in bulk density was 56% increase that was associated with multi-pass skid trails. 0.59 acres of log landings within the analysis area have visual indications of excessive compaction (more than 15% increase in soil bulk density). This occurs from very frequent activity from skidders and log loading and hauling equipment. In total, 3.9% of the analysis area measured is affected by more than a 15% increase in bulk density (soil compaction).

Deer Hollow Timber Sale Monitoring – 67% of the skid trails in the analysis area were compacted by more than a 15% bulk density increase. The largest increase in bulk density was 28% increase that was associated with multi-pass skid trails. 0.66 acres of log landings within the analysis area have visual indications of excessive compaction (more than 15% increase in soil bulk density). This occurs from very frequent activity from skidders and log loading and hauling equipment. In total, 10.8% of the analysis area measured is affected by more than a 15% increase in bulk density (soil compaction).

### Interpretation.

**Is further evaluation needed?** Yes, findings have shown that an increase in bulk density has occurred, but these sites may not be detrimentally disturbed by following Forest Service Manual direction (FSM 2550). Additional timber sale administration is needed during periods of high soil moisture to limit soil compaction damage.

**What are the implications?** Poor water infiltration and slow vegetation recovery from compacted soil condition.

**Conclusion.** We need to increase timber sale administration efforts during spring/summer conditions and during the summer monsoonal season to ensure that high soil moisture conditions are being monitored adequately.

### **Monitoring Resources Available.**

Timber sale administrators and soil scientists conduct soil compaction monitoring on a project basis.

### **Recommendation.**

Implementation and effectiveness monitoring will continue to be done on selected timber sales to ensure compaction damage does not exceed Soil Quality Manual direction.

**Multi-pass skid trail in the Bridge Timber Salvage Sale. This location showed an increase in soil bulk density from natural (undisturbed for skid trail trafficking) conditions.**





## C. Uplands Adjacent to Riparian

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Upland areas adjacent to riparian management areas.	Fabric dams, erosion pins, visual estimates, photo points, and/or other accepted methods on 2 locations per year; report first and fifth year following management practice.	H/M	Exceed Forest Standards and Guidelines.

### Methods.

The Spring Creek Area Allotment Review (Pine Valley Ranger District) and the Birch Creek Riparian Thinning Project (Escalante Ranger District) were monitored in 2014.

### Variation.

Exceed Forest standards and guidelines.

### Results.

Spring Creek Area Allotment Review - The pools contained fine sediments from extensive erosion from the channel walls below the seven foot terrace. The seven foot terraces on both sides of the stream were steep with loose sediments lacking vegetation and readily sloughing down into the stream when walked upon. A potential source of this erosion can be from nine cattle paths entering the flood plain from the seven foot terrace. Six of these paths were ~5ft wide and three of these paths were ~10-15ft wide. No vegetation was present in these paths.

Birch Creek Riparian Thinning Project - There was no evidence of soil displacement or log decking where trees were removed commercially. No quantitative data was collected that can determine if the treatment exceeded the standard and guide of maintaining at least 80% of potential ground cover and if the standard and guide was effective at helping to “provide healthy, self-perpetuating plant communities, meet water quality standards...and provide stable stream channels...”. However, visual observations suggested that potential groundcover was not decreased due to the treatment as woody debris was left within 100 feet of the stream and in some locations woody riparian dependent species appear to be growing in the place of the removed conifer species. Livestock grazing within the easily accessible treated areas was observed to be in exceedance of standards.

### Interpretation.

#### Is further evaluation needed? What are the implications?

Birch Creek Riparian Thinning Project - Despite the vegetation treatment standards and guides appearing to have been kept, these standards and guides are not effective at limiting the impacts that livestock grazing can have on the riparian area after the vegetation treatment. Although this was not a range project, due to the impact grazing can have on riparian

vegetation it seems appropriate to account for and monitor these impacts while at the same time monitoring the impacts of the vegetation treatment project. Although it has been a limited amount of time since implementation of the project some interpretations and conclusions can be made based on the observations' results. The first of these is that hand treatment in the riparian area can be accomplished in a manner that will not minimize groundcover. The second is that commercial or mechanical methods of tree removal during the winter from a riparian area that parallels a road can be accomplished without causing noticeable damage to soils. The other interpretation that can be made is that livestock grazing left unchanged has the potential to negatively impact the riparian vegetation and channel after tree removal and plans to minimize these impacts should be included in analyses dealing with riparian vegetation treatments.

Spring Creek Area Allotment Review – An evaluation of livestock use in the Spring Creek area is needed. Fine sediments are collecting in this riparian system from excessive trailing in this area.

**Conclusion.** We need to continue to monitor various projects associated with Riparian Management Areas (9A & 9B).

**Monitoring Resources Available.**

Projects near riparian Management Areas are monitored annually by zone hydrologists.

**Recommendation.**

Continue monitoring.

## D. Soil and Water Resource Protection

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil and water resource protection – project EA mitigating requirements	Visual estimates on 1 project per year per Ranger District; annual reporting.	H/M	Mitigating requirements not implemented or not working

### Methods.

Projects that emphasize monitoring specifically of EA mitigating requirements (also known as “best management practices” or BMPs) were completed in 2014.

### Variation.

Mitigating requirements not implemented or not working would cause further evaluation and/or change in management direction.

### Results.

Hoodle Timber Sale (Powell Ranger District) – The BMPs for this sale were not effective, primarily from machine operation across multiple riparian areas.

Little Pinto Creek and Sandy Creek Noxious Weed Treatment Sites (Pine Valley and Escalante Ranger District) – The BMPs were effective in ensuring chemicals were controlled near waterbodies and streams.

Sandy Creek and Irontown/Ryepatch Grazing Management – The BMPs were not effective primarily due to poor livestock rotation and lack of permit compliance.

### Interpretation.

**Is further evaluation needed?** Yes, best management practices need further monitoring and emphasis in environmental documents to ensure that they can be implemented properly on the Forest.

**What are the implications?** Best management practices are being implemented on the Forest, communication is needed on the importance of properly implementing the practices described in projects.

**Conclusion.** The Forest soil scientist and Zone hydrologists need to continue to educate resource staff on the use of BMPs.

### Monitoring Resources Available.

Projects are monitored annually by Zone hydrologists and Forest soil scientist.

### Recommendation.

Continue monitoring. Project administrators should document BMP implementation on site through use of simple BMP checklist compiled from NEPA document.



## E. Soil Survey Activities

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil survey activities.	Progress reviews, management attainment report annually during years of programmed survey work; report annually.	H/H	± 15% of Plan direction

### Methods.

Evaluation of soil survey activities on the Dixie National Forest.

### Variation.

Forest Plan direction is to complete the soil resource inventory at an Order 3 level on the productive forest and rangeland, and an Order 4 level on lower producing lands (page II-52).

### Results.

Forest-wide field soil inventory data collection (described on page II-51 of the Forest Plan) has been completed. Future analysis of this data will determine if additional fieldwork is needed.

### Interpretation.

**Is further evaluation needed?** No. Inventory completion is within the 15% variance.

**What are the implications?** None.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction was identified.

### Monitoring Resources Available.

Resources have been available for this inventory.

### Recommendation.

Soil survey work will now shift to population and utilization of the National Soil Information System (NASIS) database to assist with project- and above-project-level analysis.

## F. Soil and Water Improvements Inventory

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Soil and water resource improvement needs inventory	Annual Update and report.	H/H	Detection of improvement needs requiring early treatment or of higher priority than on current list.

### Methods.

Assessments of ecosystems above the project-level to identify and prioritize restoration and land management actions necessary to achieve management objectives for watersheds and landscapes.

### Variation.

Detection of improvement needs requiring early treatment or has higher priority than on current list.

### Results.

The Watershed Condition Framework was completed in 2011 and rated all watersheds as properly functioning, functioning-at-risk, or impaired. This database will be used to select watershed projects in the future for the Forest. Two watershed action plans (Birch Creek and Tropic Reservoir) were developed from this process that identifies specific watershed improvement projects that will be pursued within the next few years.

### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** Watershed improvement needs are being identified where desired conditions are not being achieved.

### Monitoring Resources Available.

The hydrologists have increased support to Districts and will update the Forest-wide watershed condition framework (WCATT) as needed, to develop proposals for out-year project planning to define improvement objectives and, with the Soil and Water Program Manager and Ecosystem Management Staff Officer, program adequate out-year funding to accomplish objectives. Districts and the hydrologists will coordinate more closely on implementation of complex projects, by clearly defining objectives and developing plans well in advance of implementation.

### Recommendation.

Continue updating watershed needs inventories.

**Road decommissioning projects, such as this on the Cedar City Ranger District, are treatments that reduce meadow soil compaction.**



## SECTION 12. WATER

### A. Water Quality Standards Compliance

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with State Water Quality Standards	Monthly baseline monitoring as described in Dixie Water Quality monitoring Plan, coordination with State 208 Agency; report annually.	M/M	Violation of Utah Water Quality Standards.

#### Methods.

Monthly baseline water quality monitoring sampling.

#### Variation.

Violation of Utah Water Quality Standards.

#### Results.

Water quality on four sites were sampled and analyzed in fiscal year 2014.

1. South Fork Ash Creek (STORET 4950743), tributary to the Virgin River
2. Main Canyon – New Harmony (STORET 4950755), tributary to the Virgin River
3. Hall Creek (STORET 4953947), tributary to the Escalante River
4. Water Canyon Creek (STORET 4953945), tributary to Escalante River

South Fork Ash Creek: Eleven field samples were taken and of these none exceeded the state standards for the state standards for phosphate-phosphorus which is a decrease from the 2013 water year by three samples. Field measurements of turbidity indicated a clear water column on most visits except for August when a 1 order of magnitude increase of 28 NTUs from the usual of 2-4 NTUs. Nothing in the field notes or observations gave any indication for the increase other than the increase in summer rainfall. Since the beneficial uses for this water body are recreation, aesthetics and agriculture there isn't an assigned standard for dissolved oxygen so no exceedances were observed.

Main Canyon – New Harmony: Eleven field samples were taken and of these 6 exceeded the state standards for phosphate-phosphorus which is a decrease from the 2013 water year by 1 sample. Field measurements of turbidity indicated a clear water column on most visits except for April when a 1 order of magnitude increase of 12 NTUs from the usual of about 2 NTUs. Field notes indicated that the increase in turbidity was due to increased runoff during the April measurement. Since the beneficial uses for this water body are recreation, aesthetics and agriculture there isn't an assigned standard for dissolved oxygen so no exceedances were observed.

Hall Creek: Although 10 field samples were taken only 9 samples had all in-situ parameters measured due to equipment failure in May. One dissolved oxygen measurement slightly exceeded standard for when early life stages were present (Table 1). Neither pH or

phosphorus was exceeded, although 2 samples were close to the phosphorus exceedance standard. Differing from the 2013 sampling year, in 2014 Hall Creek did not have the highest level of phosphorous only during the summer baseflow period; some of the highest values were also recorded in the late winter.

Water Canyon Creek: Like with Hall Creek, although 10 field samples were taken only 9 samples in Water Canyon had all in-situ parameters measured due to equipment failure in May. One dissolved oxygen measurement slightly exceeded standard for when early life stages were present (Table 1). Neither pH or phosphorus were exceeded.

### **Interpretation.**

**Is further evaluation needed?** Yes. Some samples exceeded the State phosphorus criteria levels. The remaining parameters (except dissolved oxygen and pH on one measurement) had a one hundred percent compliance with State Water Quality Standards.

The phosphorous exceedences for Main Canyon-New Harmony may be attributable to past wildland fires in 2012 for Main Canyon.

As found with other monitoring done within the Birch Creek subwatershed, Phosphorus levels are likely to be related to the surrounding geology and flow-paths through a particular lithology. This interpretation is based on the observation that although these streams are very close to each other (less than 1 mile away), Water Canyon is consistently lower in phosphorus than Hall Creek (as confirmed with a 95% confidence interval using a T-Test) and has less of the drainage being covered by igneous rock. Based on geomorphic monitoring done on both streams and stage monitoring done on Hall Creek, Water Canyon responds more rapidly and quantitatively to precipitation events which could indicate that Hall Creek has a higher percentage of flow throughout the year that is supported by springs with a longer residence time.

Results from different sampling sites from different years on the forest are starting to show a trend of exceeding or coming close to exceeding standards for phosphorus during some portion of the sampling year, leading to a hypothesis that native geology is playing a measurable role in phosphorus input to many of the streams in southwestern Utah. However, since the sampling is done discretely (once per month) and the temporal extent of some of the parameters is not known, it is unknown if other acute exceedences occur throughout the year.

The low dissolved oxygen value that was measured for both Hall Creek and Water Canyon Creek was in the month of June during a year when the spring runoff was minimal to non-existent and could be low because flow values were low during a warm period of the year when the biological oxygen demand was high. However it is just one discrete sample and the possibility of equipment malfunction cannot be ruled out. The forest fisheries biologist has observed that very few fish are found in the lower end of Hall Creek. Additional dissolved oxygen monitoring should be done in the late spring and early summer as often as possible on Hall Creek (i.e. anytime the east zone hydrologist is driving by the site) to determine if indeed there is a low dissolved oxygen issue in the lower end of the stream during that time of year.

**What are the implications?** Some streams may not have the capability to meet water quality standards due to the nature of the soil and geology, especially phosphorus. Water quality sampling indicates that we are usually in compliance with State of Utah Water Quality Standards. Exceptions to this appear to be phosphorus and suspended sediment.

Results from different sampling sites from different years on the Forest are starting to show a trend of perpetually exceeding standards for phosphorus, leading to a hypothesis that native geology and post-fire runoff are playing a measurable role in phosphorus input to many of the streams in southwestern Utah.

**Conclusion.** Natural background of geologic materials may be affecting water quality more than land management practices.

### **Monitoring Resources Available.**

District and Forest Hydrologists plan and implement monitoring water quality. Sampling has been done every year on a monthly basis.

### **Recommendation.**

In order to measure water quality that is reflective of watershed conditions, it is important to select sites for sampling that will be as stable as possible so as to avoid measuring localized anomalies in the stream water quality.

## **B. Best Management Practices – Water Quality**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effectiveness of Best Management Practices in meeting water quality objectives and goals.	Project monitoring as described in Dixie Water Quality Monitoring Plan or project plans, to include chemical, physical, bacteriological, invertebrate, sedimentation or other parameters needed to meet monitoring objectives, variable frequency for measurement and reporting.	H/H	Non-achievement of water quality goals, violation of Utah Water Quality Standards
	Inspection of drainage and erosion control measures on ground disturbing activities annually; annual reporting.	M/M	Exceed Forest standards and guidelines.

### **Methods.**

Project monitoring to evaluate if sedimentation or other parameters are needed to meet monitoring objectives.

## **Variation.**

Not achieving water quality goals, violation of Utah Water Quality Standards, and exceeding Forest standards and guidelines would cause further evaluation and/or a change in management direction.

## **Results.**

Birch and Hall Creek Aquatic Organism Passage Projects (Escalante Ranger District) – Both locations don't show any sign of channel instability since construction of the AOP projects. There was no noticeable erosion observed at the Birch Creek site as vegetation has grown back in very well on the side slopes of the disturbed areas. There was a noticeable number of willows that grew back in along Birch Creek but nearly all of them had been browsed by what appeared to be livestock (based on the evidence of tracks and feces). The Hall Creek site does show signs of some erosion where the bypass road was put in and then ripped and recontoured. The riparian vegetation surrounding each of the sites showed signs of ungulate use.

Blubber Creek Drop Structure (Powell Ranger District) – After the initial turn-out of water to the new channel the stream substrate moved and the channel adjusted in accord with the flow volume and gradient. The cut-off seals on two of the rock vane structures were not completely sealed off in the newly constructed bank and after a few days' time the structures vanes were not functioning as designed by letting more water pass toward the bank and under the cut-off seals. These structures were repaired by adding some more rock footers in the cut-off seal but also lining the entire cut-off seal with geotextile fabric that filled in the gaps between rocks. This repair held well and returned the proper functioning of the rock vane steps. The sedge mats and sedge plugs that were planted appeared to be surviving and the stream bank and side slopes showed successful germination of plants through the matting. On September 27<sup>th</sup> and 28<sup>th</sup> a relatively long duration storm event occurred in the Paria and East Fork Sevier subbasins leading to some very large floods. In the mainstem of the Paria River for example the flood was large enough to wash out a bridge designed for a 100 year flow event. It was observed that in Blubber Creek that despite there being an overflow channel the stream flooded to a depth of approximately 0.5 feet across the entire width of the concrete spillway (20ft) with the center or crest being approximately 4 feet wide and 1 foot deeper than the rest of the spillway. The concrete spillway didn't show any signs of being compromised by the flooding. Photos from Blubber Creek that were taken a few days after the flooding show that two of the rock structures failed during the flooding (not the same two structures repaired earlier) appearing to again be from the cut-off seals being undermined by the streamflow. The remaining structures appear to be intact and functioning.

## **Interpretation.**

### **Is further evaluation needed? What are the implications?**

Birch and Hall Creek Aquatic Organism Passage Projects (Escalante Ranger District) – The grade control structures appear to be very successful in achieving their intended result of stepping up the stream while at the same time maintaining channel stability. The difference in upland erosion caused by the projects is most likely due to the fact that Birch Creek did not require a by-pass road and Hall Creek did. The disturbance caused by installing and then



decommissioning a by-pass road was in this case greater than the disturbance caused by just installing stream structures. For future projects like these, erosion control matting should be used on disturbed areas if there is any degree of slope. Temporary fencing should be installed around these types of project sites if they are part of an active grazing allotment in order to allow the riparian vegetation to better reestablish and gain vigor after being disturbed.

Blubber Creek Drop Structure (Powell Ranger District) – Reconstructing a new channel and floodplain in a location where there has not been a previously established channel has presented a number of lessons learned. One lesson learned is the need to put in deeper footer rocks and geotextile fabric for the cut off seals on the rock vanes when working in a fine substrate system where the stream channel and bank is being newly constructed. Most of the other channel reconstruction projects on the Dixie up to this point have been in locations where the existing stream bank can be used and the imbricated soil and rock structure along with roots .have been effective at keeping the cut off seal intact (geotextile fabric has only been needed on the portion of the rock vane that is in the newly constructed active channel). Another lesson learned is to salvage as much of the sedge matts as possible and plant them before rolling the coir matt over the stream banks so that the sedge can be underneath the protective cover of the coir.. Lastly, when constructing a completely new channel and bank in a vegetation dependent stream type it should be planned in the budget for use of equipment, materials, and personnel during the first few years after the construction of the new channel in order to make repairs and adjustments until the stream channel becomes stable through the establishment of vegetation. As discussed in the background section, it was known that the establishment of vegetation for the construction of this channel type is critical for the success of the project and that the channel is left vulnerable to any flood events that may occur until stream bank vegetation is well established. The large precipitation event that resulted in lower frequency flooding could not be predicted and therefore not much could be done to militate against such an event. Additional maintenance and repair of some of the structures will need to be done in the summer of 2015 and possible future years until the riparian vegetation is well established. A complete list of lessons learned from this project can be found in the hydrology files on the Escalante Ranger District.

**Conclusion.** Soil and water conservation practices need to be applied on all projects.

#### **Monitoring Resources Available.**

Zone Hydrologists conduct monitoring on a project basis.

#### **Recommendation.**

Continue monitoring best management practices.

### **C. East Fork Sevier River Water Yield Increases**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Water yield increases in East Fork of Sevier Watershed	WRENS water yield methodology; annual monitoring and reporting.	L/M	Exceed minimum management requirements in timber harvest model



**Methods.**

Water yield measurements.

**Variation.**

Exceeding minimum management requirements in timber harvest model.

**Results.**

This monitoring has been dropped from consideration. It is not our intent to increase the spring discharge of the Sevier River but rather to improve and maintain the channel, floodplain, and sponge/filter system of the watershed in such a way as to maintain a dynamic equilibrium within the watershed.

**Interpretation.**

**Is further evaluation needed?** No, not relevant.

**What are the implications?** The premise for this monitoring is no longer accepted science.

**Conclusion.** There is a variation causing further evaluation and/or change in management direction, which is the premise that management activities would be designed to increase water yield, when the desired conditions are not such.

**Monitoring Resources Available.**

No resources have been allocated for this monitoring.

**Recommendation.**

A Forest Plan change is needed to drop this monitoring requirement.

**D. East Fork Sevier River Stream bank Stability**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Stability of Stream banks in East Fork of Sevier River drainages	Sequential photopoints, measure stability rating in representative reaches; annual reporting and monitoring.	M/M	Exceed Forest standards and guidelines

**Methods.**

General Technical Report RMRS-GTR-47 “Monitoring the Vegetation Resources in Riparian Areas” by Alma H. Winward, April 2000.

Additional clarification for riparian studies was adapted from General Technical Report RMRS-GTR-121 “Guide to Effective Monitoring of Aquatic and Riparian Resources – Part III: Effectiveness Monitoring for Streams and Riparian Areas Within the Upper Columbia River Basin: Sampling Protocol for Integrator Reaches Vegetation Parameters” by Marc Coles-Ritchie and Richard C. Henderson, March 2004.

Additional clarification for riparian studies and species' ecological status and stream bank stability ratings were adapted from Idaho Technical Bulletin No. 2005-02 "Monitoring Stream banks and Riparian Vegetation – Multiple Indicators" by Ervin R. Cowley and Timothy A. Burton, September 2005.

### **Variation.**

Variation that would cause further evaluation and/or change in management direction would be to "Exceed Forest standards and guidelines".

### **Results.**

During 2014, 365 long-term trend monitoring studies were completed on the Dixie National Forest. 250 were upland range trend monitoring studies, 78 were Level III Riparian Inventories, and 37 were photo points completed by Forest personnel.

These monitoring studies were performed in 61 allotments across the Dixie National Forest. This work was accomplished by the Forest Vegetation Monitoring Crew. People on this crew included Mark Madsen (Forest Botanist), and Jeff Curtis (Biological Science Technician). These monitoring studies were accomplished during the 2014 field season from March 25 – October 31.

*Stream bank stability:* Forest Plan standards and guidelines for bank stability (general direction – standard and guideline 4A – pg. IV-42) and wildlife and fish (general direction - standard and guideline 6B – pg. IV-33) require that we "maintain 50 percent or more of total stream bank length in stable condition." For this analysis, this standard is interpreted as maintaining 50 percent of all riparian areas with at least a moderate bank stability rating. Out of the 78 Level III Riparian Inventories sampled on the Dixie National Forest in 2014, 76 (97%) had stream bank stability ratings that were rated as moderate, good, or excellent. These ratings indicate long-term stable bank conditions in these riparian areas. There were 15 riparian monitoring sample sites evaluated for the East Fork of the Sevier River drainage in 2014. Out of these 15 sites, all (100%) had streambank stability ratings that were rated as moderate, good, or excellent. Therefore, no further evaluation and/or change in management direction is needed at this time.

### **Interpretation.**

**Is further evaluation needed?** No. There were 15 riparian monitoring sample sites evaluated for the East Fork of the Sevier River drainage in 2014. Out of these 15 sites, all (100%) had streambank stability ratings that were rated as moderate, good, or excellent. Therefore, no further evaluation and/or change in management direction is needed at this time.

**What are the implications?** If the stream bank stability levels were to drop below 50 percent with moderate ratings, increased soil loss, sedimentation, and less stable riparian systems could occur. Dixie National Forest Plan standards and guidelines would also be exceeded.

**Conclusion.** There were no sample sites evaluated for the East Fork of the Sevier River drainage in 2014 that exceeded Forest Plan standards and guidelines. Therefore, no further evaluation and/or change in management direction is needed at this time. If areas were

identified exceeding Forest Plan standards and guidelines for bank stability, these locations would be sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determined that these areas are able to be improved through permit action, then an adjustment in the AOIs for each site affected would be made.

#### **Monitoring Resources Available.**

Yes. This monitoring is the responsibility of the Dixie NF Botanist and long-term vegetation monitoring crew.

#### **Recommendation.**

Continue to monitor the East Fork Sevier stream bank stability annually.

### **E. Watershed Improvement Effectiveness and Maintenance Needs**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effectiveness and Maintenance needs of watershed improvements	Visual inspection 1 <sup>st</sup> year after installation and every 5 years thereafter. Annual reporting.	L/H	Maintenance required or project not accomplishing stated objectives.
	Volumetric measurements of retained sediments, variable frequency and reporting.	M/M	Project not accomplishing stated objectives

#### **Methods.**

Visual project monitoring.

#### **Variation.**

For watershed improvements, stated objectives are not met or maintenance not completed.  
For retained sediment, project not accomplishing stated objectives.

#### **Results.**

During 2014, three watershed improvements projects were monitored:

Road Closures (Cedar City Ranger District) - Of 37 sites monitored, 4 showed signs of recent use. The failed closures showed recent tracks though barriers that had been removed or tracks around barriers. Many sites did not have road closure signs posted or barriers constructed, however most of these showed no evidence of recent use and were fairly vegetated. Some decommissioned roads were difficult to locate due to the lack of signs and regrowth of vegetation. The majority of the decommissioned roads were effective in preventing further use. Most of the sites had well established vegetation and appeared to be recovering. Of the failed closures, the barriers were often built from logs that could be somewhat easily moved or absent altogether. Some of the obstacles had been replaced after recent use. Those closures constructed with boulders were almost always effective at barricading the roads. It is

therefore recommended that to fully prevent usage on these roads, that more substantial barriers be built.

Jacobs Reservoir Road Relocation Repair Project (Escalante Ranger District) - There was no evidence of vehicle use off of the raised road bed. Ripping was observed to be very deep and adequate water barring was installed. Full recontouring was not done in locations where the rutting was very deep. Cattle trampling of the ripped areas occurred shortly after being completed. Vegetation did not appear to be growing noticeably in the ripped areas. There was no evidence observed of rilling occurring in the ripped areas. Although it appears that raising the road bed has been effective at minimizing off road travel, there has not been adequate time to determine the full effectiveness of the treatment and design features. For example, due to the treatment being in the dry portion of the summer plant revegetation has not yet occurred. Due to the depth of the rutting and loss of soil from erosion, the full recontouring was not possible without bringing in additional top-soil from other locations and so it was not completely recontoured. However, the water barring seemed adequate and after a spring runoff the effectiveness of the ripping and woody material without full recontouring can be assessed. For projects of this type that woody material should be added immediately after the ground disturbing activity occurs in order to minimize compaction from hoofed animals. Further monitoring should be done on the effectiveness of the design features of this project in restoring old road paths and minimizing erosion.

Pilot Creek Road Obliteration Project (Pine Valley Ranger District) - Overall the obliteration did not meet the expectations of Soil, Water, Fisheries and Recreation. Where there was just a cow trail prior to the disturbance there is now a trail that in some places is 12 ft. wide. Where soil had been placed in Pilot Creek as fill it was not removed. This not only constitutes a Clean Water Act violation but is not Forest Plan compliant. Re-contouring of this road obliteration project is incomplete.

### **Interpretation.**

**Is further evaluation needed?** Yes, many projects were not monitored after they were installed.

**What are the implications?** We are learning from implementing projects that there are different ways to improve resource protection.

**Conclusion.** We need to emphasize follow-up monitoring on watershed project implementation.

### **Monitoring Resources Available.**

District and Forest Hydrologists conduct monitoring on a project basis.

### **Recommendation.**

Continue monitoring.

## F. Riparian Area Management Goal Accomplishment

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Accomplishment of riparian area management goals	Sequential photopoints, forage utilization level measurements (total and browse), stream channel stability ratings, stream channel morphology measurements, streambed materials measurements; annual monitoring and reporting.	M/H	Exceed Forest standards and guidelines.

### Methods.

- Stream channel morphology and materials measurements and water temperature monitoring.
- General Technical Report RMRS-GTR-47 “Monitoring the Vegetation Resources in Riparian Areas” by Alma H. Winward, April 2000.
- Additional clarification for riparian studies was adapted from General Technical Report RMRS-GTR-121 “Guide to Effective Monitoring of Aquatic and Riparian Resources – Part III: Effectiveness Monitoring for Streams and Riparian Areas within the Upper Columbia River Basin: Sampling Protocol for Integrator Reaches Vegetation Parameters” by Marc Coles-Ritchie and Richard C. Henderson, March 2004.
- Additional clarification for riparian studies and species’ ecological status and stream bank stability ratings were adapted from Idaho Technical Bulletin No. 2005-02 “Monitoring Stream banks and Riparian Vegetation – Multiple Indicators” by Ervin R. Cowley and Timothy A. Burton, September 2005.

### Variation.

Forest Plan standards and guidelines exceeded.

### Results.

#### Forestwide Riparian Vegetation and Ground Cover Monitoring

*Successional Status:* The Forest Plan requires the Forest to maintain riparian areas at  $\geq 60\%$  of potential for management level 3 riparian areas. Potential for late seral community types is defined by % gradient and substrate classes (Dixie NF LRMP IV-41 amended 9/95; revised 3/96). In a sample of 78 riparian sites across the Forest during 2014, 60 of the sampled riparian areas (77%) are maintained at 60% of potential or above as required in the Forest Plan for management level 3 riparian areas. 18 riparian sites (23%) are not being maintained at 60% of potential as required by the Forest Plan. 2 of these 18 riparian sites not meeting Forest Plan requirements are on the Powell Ranger District and are the direct result of the Sanford wildfire that burned through these riparian areas in 2002. These riparian areas have not yet recovered from this large wildfire. Therefore, there are a total of 16 monitoring sites

of 78 (21% of all Level III Riparian Inventories performed in 2014) where the Forest Plan Standards and Guidelines have been exceeded and may be a result of management activities not influenced by uncontrolled wildfire. The riparian areas that are not meeting Forest Plan standards and guidelines are located on the Pine Valley, Cedar City, Powell, Escalante, and Teasdale Ranger Districts of the Dixie National Forest. Therefore, further evaluation of these riparian sites may be warranted to determine if a change in management direction is needed and able to improve them.

*Percent Ground Cover:* Forest Plan standards and guidelines specific to Management Areas 4A, 9A, and 9B for ground cover in riparian areas (Management Area 4A direction – standard and guideline 4B – pg. IV-79, Management Area 9A direction - standard and guideline 3B – pg. IV-141, and Management Area 9B direction – standard and guideline 3B – pg. IV-150) require that the Forest: “Maintain at least 80 percent of potential ground cover within 100 feet from the edges of all perennial streams, lakes, and other water bodies, or to the outer margin of the riparian ecosystem, where wider than 100 feet.” Since no potential ground covers have been defined for riparian areas on the Dixie National Forest, for the purpose of this analysis, potential is assumed to be 100 percent for all riparian areas. Out of the 78 Level III Riparian Inventories sampled on the Dixie National Forest in 2014, 17 fell within Management Area 9A. Two sample sites fell within Management Area 9B. Of these 19 riparian inventories, 3 of them (16%) had ground covers of less than 80% along the green-line. These 3 sites are found on three pastures of the Pine Valley, Cedar City, and Teasdale Ranger Districts. Therefore, further evaluation of these riparian sites may be warranted to determine if a change in management direction is needed and able to improve them.

Deer Creek (Powell Ranger District) Cross-Sectional Analysis - It appears that Deer Creek has recovered from the 2002 Sanford fire. The flood plain is well vegetated and has bank full indicators which suggest that it is containing the stream’s flow. The decreasing bankfull area and width to depth ratio, along with the increasing wetted perimeter suggest that the channel is becoming more entrenched which is typical of an A4 stream. This can also be observed on the cross section graphs. The flood plains show no change from year to year but, it appears that Deer Creek is now eroding within the channel after several years of deposition. The pebble counts suggest that the stream’s substrate is stable and that there is no events occurring upstream which are adversely affecting the stream.

Holt Canyon Creek (Pine Valley Ranger District) Cross-Sectional Analysis - The surveyed reach in Holt Canyon is actively eroding as evidenced in comparisons of photos from 2002 to 2014 and in the cross section graphs, and pebble count results. Hydric vegetation has been drastically decreased and is either very sparse or absent on 3-ft terraces. Cattle were present at the time of the survey and trails/alterations are visible at all cross sections. Upstream of cross section one where slopes were steeper and cattle trails were not observed, willows were present and contributing to bank stability. This suggests that erosion and instability is related to cattle alterations. However, there was also decreased vegetation in very steep banks (near vertical) where sloughing had occurred unrelated to cattle and more due to slope steepness. Floating aquatic plants and moss are present in the stream reach which may signal the initial stages of regaining stability. The relocation of cross section pins in 2002 and 2006 further attest to the general instability of the area. One of the pins that we relocated was found hanging loosely in the bank pointing down, where sloughing is occurring. Rain-splash crust was observed and the steep, sparsely vegetated banks are vulnerable to rainfall events. While

the presence of abundant aquatic plants may point to healing of the channel, the area is actively eroding and decreasing in riparian vegetation that contributes to bank stability. We suggest Multiple Indicator Monitoring Surveys (MIMS) be conducted to guide future planning. This may help determine the extent of bank alterations and channel widening, and if the causes are primarily due to overgrazing specifically.

Midway Creek (Cedar City Ranger District) Cross-Sectional Analysis - Since Midway Creek is located within a wetland ecosystem situated on a flat, high elevation, alpine meadow; ample moisture is available most the year for the riparian and non-hydric vegetation to develop and stabilize the substrate. This stability is limited, however, as the vegetation mainly consists of vascular plants and no willows or other course-woody vegetation that could enhance stability. The wide valley, shallow slopes, and finer sediments help to promote the meandering characteristic of the stream when it flows. Repeat surveys have recorded a consistent rate of lateral erosion and migration of stream meanders, with the majority of erosion occurring on the outer meanders forming steeply incised cut banks with slopes between 25-35°. Along straight reaches of the channel entrenchment is evident, but banks are stable with little evidence of erosion and vegetation is well established. Some evidence of domestic sheep grazing was visible at the time of the survey, but it is known that sheep have grazed this area in the past as well. The grazing of sheep can possibly promote increased erosion by destabilizing the sensitive substrate, especially near outside meander bends. When comparing the result of all three years of cross-section surveys and pebble counts, the evidence shows that fines are increasing within the channel from destabilizing and laterally eroding cut banks and possible upstream erosion as well. The state of erosion overall does not seem very extreme and is limited to outer meander bend cut banks, while the rest of the flood plain and channel is well covered with vegetation, adding to its stability. All three cross-sectional graphs show relatively consistent trends, but the increase in finer sediments from the pebble count surveys at Cross Section-1 and 2 may be a sign of increasing erosion and fragility of the substrate, and regular monitoring of grazing activities is recommended to detect signs of increasing rates of erosion, so plans for mitigation can be developed.

### **Interpretation.**

**Is further evaluation needed?** Yes; 24% of riparian sites sampled on the Dixie National Forest in 2014 are exceeding standards and guidelines as specified in the Forest Plan. On these sites, this may lead to increased soil loss, sedimentation, and less stable riparian systems.

**What are the implications?** Riparian areas may not be in or moving toward desired conditions.

**Conclusion.** Areas identified as exceeding this Forest Plan Standard and guideline for riparian condition are sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determines that these areas are able to be improved through permit action, then an adjustment in the AOIs for each site affected should be made.

### **Monitoring Resources Available.**

Hydrologists and the Forest Botanist have been conducting measurements.

**Recommendation.**

Continue to perform riparian monitoring annually. Areas identified as exceeding Forest Plan standards and guidelines for riparian condition should be sent to the appropriate District rangeland management specialist to be evaluated. If the range specialist determines that these areas are able to be improved through permit action, then an adjustment in the AOIs for each site affected should be made.

**Monitoring stream cross section in the Holt Canyon (Pine Valley Ranger District).**



## SECTION 13. MINERALS

### A. Exploration Proposals

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Exploration proposal: adequacy of permitting process	Evaluation of one case history on each Ranger District; annual reporting.	M/M	Non-compliance with the Regional standards and direction

#### Methods.

Evaluation of mineral proposals.

#### Variation.

Non-compliance with the Regional standards and direction.

#### Results.

In 2014, the Dixie NF has monitored the activities for two existing Plans of Operations for exploration of locatable minerals. Dixie National Forest works closely with State officials for locatable mineral operations compliance, bonding and reclamation. Demand continues to be moderate and steady for locatable minerals and there is an increase in demand for mineral materials from individuals, counties and State.

#### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** All exploration activities remained compliant with the Plans of Operation.

#### Monitoring Resources Available.

Dixie Mineral Staff and Utah State Department of Oil Gas and Mining personnel.

#### Recommendation.

Continue monitoring when new proposals are received and at least quarterly during active explorations.

## B. Lease/Permit Applications

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Lease/Permit application forms and NEPA process (compliance with Regional standards and direction)	Inventory pending cases, evaluate adequacy of lease/permit and operating plan requirements, review EAs covering leasing and permits. Evaluate one on each Ranger District. Annual reporting.	M/M	Deviation from 1984 (1991) FS/BLM Agreement, lease and operating plan requirement are found inadequate to meet multiple resource needs, EAs inadequate.

### Methods.

Evaluation of leasing/permit process.

### Variation.

Deviation from 1984 Forest Service/Bureau of Land Management (FS/BLM) Agreement, lease and operating plan requirement are found inadequate to meet multiple resource needs, Environmental Assessments (EAs) inadequate.

### Results.

Expressions of interest for 16 parcels are being reviewed by resource staff for future BLM oil and gas lease sales. The BLM is responsible to respond to these expressions of interest and to inform the Dixie NF when expressions are being considered. The BLM State Office must provide the Forest Service a copy of the notice of competitive lease sale at least 30 days prior to final posting and printing to allow the forest 30 days to review and respond that the correct stipulations are being used for each sale parcel on FS lands.

The Environmental Impact Statement for Oil and Gas Leasing Analysis was completed for the Dixie NF and a Record of Decision was signed August 23, 2011. The Forest Plan was amended (Amendment # 24) to include Procedures for Oil and Gas Leasing, the Oil and Gas Leasing Matrix, and updated resource protection stipulations for lands administered by the Dixie NF. No changes were made to management directions. No parcels were forwarded to the BLM for leasing in 2014.

Annual inspection reports are completed for 26 oil and gas operations. Operations were visited quarterly.

### Interpretation.

**Is further evaluation needed?** Respond to requests from BLM when Expressions of Interest are identified.

**What are the implications?** BLM will forward Expressions of Interest (EOI) to the Regional Forester for review that applicable stipulations are attached to lease parcels.

**Conclusion.** None.

**Monitoring Resources Available.**

Continue to evaluate lease/permit applications.

**Recommendation.**

Monitor leasing and on-lease activity when they resume in the future.

**C. Development Proposals and Administration**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Site-specific development proposals and administration of operations, compliance with terms of operating plans and existing agreements.	Field examination ongoing during operations, outlines in Regional standards. Annual reporting.	H/H	Any unacceptable or unexpected results that deviate from the Environmental Assessment and approved operating plan; inadequacy or unreasonableness of lease/permit terms and operating plan requirements.

**Methods.**

Field examinations are development proposals.

**Variation.**

Any unacceptable or unexpected results that deviate from the environmental assessment and approved operating plan; inadequacy or unreasonableness of lease/permit terms and operating plan requirements.

**Results.**

All active exploration projects have been examined quarterly for compliance with operating plans. All operations are compliant. The number of community mineral material sales and free-use permits (State and County) issued each year remains relatively high. Most permits are for material in existing gravel and cinder pits. Some but not all pits have operating plans. The Mineral Materials Source Site Environmental Analysis (EA) for Escalante and Powell Ranger Districts was completed. Emphasis is needed on updating mineral pit operating plans to meet future demands and to be responsive to in-Forest, County and State needs.

**Interpretation.**

**Is further evaluation needed?** Continue to evaluate for future needs.

**What are the implications?** None.

**Conclusion.** There have been no unexpected or unacceptable results that deviate from the Environmental Assessments or Operating Plans for mineral projects during 2014.

**Monitoring Resources Available.**

Continue to evaluate for future needs.

**Recommendation.**

Continue monitoring existing pits. Prepare updated analysis for expansions to meet future needs.

**D. Reclamation Results**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Reclamation results: Effectiveness of work done	Field examination annually of 25% of operational areas that have been closed 2-3 years; annual reporting.	H/H	Any unacceptable or unexpected results that deviate from the Environmental Assessment and approved operating plan

**Methods.**

Concurrent reclamation was completed at one location and final reclamation was completed for one location.

**Variation.**

Any unacceptable or unexpected results that deviate from the Environmental Assessment and approved operating plan.

**Results.**

Concurrent reclamation efforts have been monitored on two sites, neither resulting in the release of the full reclamation bonds. One project was completely reclaimed and the majority of the bond was approved for release. A portion of the bond remains, pending success of the vegetative component of the reclamation.

**Interpretation.**

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction was identified.

**Monitoring Resources Available.**

The Forest Minerals Management Specialist will conduct annual inspection to monitor revegetation results and to ascertain no encroachment occurs on decommissioned travel ways.

**Recommendation.**

Continue to contact operators when operations are nearing completion to discuss reclamation required by operating plans. Release bonds only when work is satisfactory.

## E. Reserved and Outstanding Mineral Rights

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Exercise of reserved and outstanding rights by owner of minerals	Monitor mineral-related activity on NFS surface, ongoing frequency. Reporting as activity affecting NFS management occurs.	M/M	Any impacts adverse to NFS management of surface resources.

### Methods.

Evaluation of mineral rights.

### Variation.

Any impacts adverse to National Forest System (NFS) management of surface resources.

### Results.

The Dixie National Forest has very limited areas of reserved or outstanding mineral rights. No opportunity to process or administer reserved or outstanding rights occurred over the monitoring period.

### Interpretation.

Is further evaluation needed? N/A

What are the implications? N/A

Conclusion. N/A

### Monitoring Resources Available.

The Forest Minerals Administrator along with each Ranger District has a resource specialist with minerals management duties to conduct monitoring.

### Recommendation.

None

## SECTION 14. LANDS

### A. Special Use Permits

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Special Use Permits, applications, amendments, and transfers	Quarterly land use reports. Reporting as scheduled in fiscal year action plan.	M/M	Deviation from R-4 standards

#### Methods.

Special Uses Permits<sup>10</sup> applications, amendments, and transfers evaluated in 2013.

#### Variation.

Deviation from R-4 standards.

#### Results.

Nine special use applications, amendments, or transfers in 2014 were evaluated on the Dixie National Forest.

#### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** This item tracks the volume of work relating to special use permits, applications, amendments and transfers.

#### Monitoring Resources Available.

No resources were allocated to maintain records of applications, amendments, or transfers that were processed.

#### Recommendation.

Continue monitoring to determine trends across the Forest and effects to resource specialist time allocations.

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<sup>10</sup> This monitoring item refers to non-recreation special use permits.

## B. Special Use Permit Administration and Inspection

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Special Uses (non-recreation) permit administration and inspection	Land use reports annually on permits scheduled for inspection. Reporting as scheduled in fiscal year action plan.	M/M	Deviation from R-4 standards

### Methods.

Special Uses (non-recreation) permit administration and inspection completed in 2013.

### Variation.

Deviation from Regional (R-4) standards.

### Results.

Non-recreation special use administration and inspection was implemented in 2014 on 147 permits. Region 4 standards were met.

### Interpretation.

Is further evaluation needed? No.

What are the implications? None.

Conclusion. None.

### Monitoring Resources Available.

Resources have been limited to accomplish this monitoring.

### Recommendation.

Continue monitoring.

## C. Land Survey

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Land Survey	Annual management attainment report. Reporting as scheduled in fiscal year action plan.	H/H	± 10% of planning period target

### Methods.

Surveying has been zoned to the Regional Office Team and is no longer accomplished through the Dixie National Forest.

### Variation.

Plus or minus 10% of planning period target.

### Results.

Regional staff manages land survey.

### Interpretation.

**Is further evaluation needed?** No. Accomplishment was within targets for surveying.

**What are the implications?** None.

**Conclusion.** No variation causing further evaluation and/or change in management direction has been identified.

### Monitoring Resources Available.

Resources have been available for target accomplishment and monitoring.

### Recommendation.

Review this monitoring item for possible Forest Plan change because the responsibility for this resource is no longer on the Forest.

## D. Land Exchange

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Land Exchange	Land adjustment plan, management attainment report annually on all acres planned for exchange. Reporting as scheduled in fiscal year action plan.	H/H	± 50% of planning period target

### Methods.

Land exchange activities monitored.



**Variation.**

Plus or minus 50% of planning period target.

**Results.**

No land exchanges occurred in 2014. The responsibility, funding, and priorities for land exchanges no longer reside on the Dixie National Forest. This resource has been zoned to Regional Office teams.

**Interpretation.**

**Is further evaluation needed?** No. The Forest did not accomplish land exchanges as expected in the Forest Plan.

**What are the implications?** Over time, case processing for a land exchange has increased from approximately 1-3 years to 4-5 years, which has affected the Forest's ability to meet Forest Plan expectations.

**Conclusion.** The projected target in the Forest Plan is no longer accurate.

**Resources Available.**

The Forest has no resources available to accomplish this monitoring – funding is held in the Regional Office for this resource.

**Recommendation.**

Use a Forest Plan change to drop this monitoring item.

**E. Rights-of-Way**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Rights-of-Way	Right-of-way acquisition plan annually on assigned targets. Reporting as scheduled in fiscal year action plan.	H/H	± 50% of planning period target

**Methods.**

Annual right-of-way acquisitions.

**Variation.**

Plus or minus 50% of planning period target.

**Results.**

The responsibility, funding, and priorities for rights-of-way no longer reside on the Dixie National Forest. This resource has been zoned to Regional Office teams.

**Interpretation.**

**Is further evaluation needed?** No. Rights-of-way targets were met to the best of the Forests abilities.

**What are the implications?** This monitoring, accomplishment, and priorities are determined by the Regional Office.

**Conclusion.** The targets and monitoring are no longer a responsibility of the Forest since this resource has been zoned.

**Monitoring Resources Available.**

The Forest has no resources available to accomplish this monitoring – funding is held in the Regional Office for this resource.

**Recommendation.**

Drop this monitoring item.

## **F. Through Utility Construction**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Construction of Through Utilities	Construction within approved corridors/windows; monitoring and reporting every 5 years.	H/H	Environmental analysis determines that a proposed corridor/window is better suited than those approved in the Forest Plan

**Methods.**

Implementation activity relating to the construction of through utilities.

**Variation.**

Environmental analysis determines that a proposed corridor/window is better suited than those approved in the Forest Plan.

**Results.**

Construction of two electric transmission lines was ongoing in 2014:

- PacifiCorp, Sigurd-Red Butte 345 kV electric transmission line across Pine Valley Ranger District.
- Garkane Energy, Tropic-Hatch 138 kV electric transmission line across Powell and Escalante Ranger Districts.

**Interpretation.**

**Is further evaluation needed?** No.

**What are the implications?** Corridors appear to remain appropriate. This monitoring item is out of date and not needed. Utility corridors must be designated in the Forest Plan, they cannot be designated with an EA or EIS.

**Conclusion.** No variance has been identified to change management direction.

**Monitoring Resources Available.**

Monitoring resources have been available for this item.

**Recommendation.**

Drop This Monitoring Item.

## SECTION 15. FACILITIES

### A. Road and Bridge Construction/Reconstruction

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Road and bridge construction and reconstruction	Annual accomplishment report; report every five-years.	H/H	5% deviation from projected quantities

#### Methods.

Road and bridge construction projects are accomplished through Forest Service labor or formal contracts. Engineering personnel monitor each project for contract compliance as the project is accomplished. Accomplishments are recorded in an annual roads accomplishment report.

Road bridges are inspected on a bi-annual basis. Concrete bridges are inspected by the Regional structural engineer; timber bridges are inspected by certified inspectors on the Forest.

#### Variation.

5% deviation from projected quantities. Table IV-2 in the Forest Plan projects 32 miles of local roads constructed or reconstructed in 2014. Permanent road construction is relatively rare on the Forest. Due to funding restrictions, less than ten miles of roads are generally reconstructed annually, although the number fluctuates based on the award of special project funding.

#### Results.

The following roads were reconstructed or rerouted in 2014:

1. Oak Grove Road (30032) – 4.2 miles (heavy drainage/brushing work)
2. Reed Valley (30381) – 1 mile (rerouted)

The following bridges and major culverts were constructed or reconstructed in 2014:

1. Reed Valley Aquatic Organism Passage Project
2. East Fork Aquatic Organism Passage Project

Forty three (43) bridges were inspected in 2014. Many bridges on the Forest were constructed between 40 and 50 years ago. They are reaching the end of their design life.

#### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** Road reconstruction projections should be updated to match work that can be completed with anticipated funding levels. Many bridges are near the end of their usable life. If they are not repaired, Forest access will be restricted.

**Conclusion.** The Forest annually constructs bridges for aquatic organism passage and reconstructs roads and bridges when special project funding is available, but at lower levels than are projected in the Forest Plan. Bridges are being constructed and replaced on the Forest, but these activities are generally in response to flood damage or an aquatic organism passage barrier.

The numbers of bridges reaching their design life is higher than the number being replaced on heavily-used Forest roads. Aging bridges will continue to deteriorate to the point where Forest Roads will have to be closed for public safety.

#### **Monitoring Resources Available.**

Monitoring resources are needed to inspect roads and bridges to identify health and safety issues and prioritize reconstruction projects.

#### **Recommendation.**

Adjust Forest Plan road reconstruction projections, continue monitoring.

### **B. Road Management**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Road Management	Continuous road logs condition surveys, and signs; report every five years.	M/M	5% downward trend in the condition of existing roads

#### **Methods.**

The Washington Office annually determines road condition surveys to be performed on the Forest according to a random sample. Over the past few years, the Dixie has been assigned roughly 2-3 road surveys per year.

The Forest sign crew annually identifies signs in need of repair or replacement.

#### **Variation.**

A 5% downward trend in the condition of existing roads.

#### **Results.**

The number of roads surveyed annually is too low to determine the trend in the condition of existing roads. The Forest sign crew is actively installing and replacing signs throughout the Forest.

#### **Interpretation.**

**Is further evaluation needed?** Yes.

**What are the implications?** There is insufficient data to determine the overall trend in the condition of existing roads.

**Conclusion.** There is insufficient data to determine whether the overall condition of the Forest road system is improving or deteriorating. Signage on Forest roads is improving as the sign crew is installing and repairing signs faster than they deteriorate.

### **Monitoring Resources Available.**

There are insufficient resources to conduct road condition surveys as required by the Forest Plan.

### **Recommendation.**

Pursue funds to increase condition survey frequency. Continue to monitor the condition of the road infrastructure and pursue funding for replacement and reconstruction.

## **C. Buildings**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Buildings	Annual Inspection reports. 5-year reporting.	M/M	Excessive deterioration of existing buildings

### **Methods.**

All Forest Service owned facilities are monitored according to FS direction. The Dixie National Forest is currently on a 5 year rotation for condition surveys, accomplishing approximately 20% each year. Survey results and deferred maintenance needs are entered into the INFRA database. The monitoring and entering of deferred maintenance needs allows the Forest to prioritize facility work each year.

### **Variation.**

Excessive deterioration of existing buildings.

### **Results.**

The following table shows the facilities that were monitored in FY2014.

Building ID	Building Name	Condition Survey Date	Inspector
0308	Oil & Gas House Building	08/08/2014	Steven O'Neil
0307	WCF Sign Shop and Storage Building	08/08/2014	Steven O'Neil
0303	Cedar Storage Shed	08/12/2014	Steven O'Neil
0305	Cedar Hay Shed	08/12/2014	Steven O'Neil
0741	Barney Top Commo Building	09/02/2014	Steven O'Neil
0721	Rudd's Roost Commo Site	10/31/2013	Steven O'Neil
0301	Cedar Horse Shed	08/12/2014	Steven O'Neil
0309	Cedar Dispatch/WHSE Computer STG	08/12/2014	Steven O'Neil
0716	Honeycomb CG Pumphouse	08/14/2014	Steven O'Neil
0729	White Bridge CG Pumphouse	08/06/2014	Steven O'Neil
0738	Jones Corral Pumphouse Building	06/30/2014	Steven O'Neil

0366	Escalante Pesticide Building	09/02/2014	Steven O'Neil
0243	Escalante Dwelling #2	01/27/2014	Steven O'Neil
0373	Escalante Oil Storage	09/02/2014	Steven O'Neil

All buildings have been inspected over the past ten years. Inspections revealed buildings in various states of condition. Buildings that are in use are maintained to a reasonable standard. Abandoned or unused buildings are not adequately maintained and are to be explored for decommissioning, conveyance or alternate use.

#### **Interpretation.**

**Is further evaluation needed?** Yes. Buildings that are in use and necessary to support the Forest's daily operations are to be maintained to a reasonable standard. Buildings that are abandoned or do not support the Forest's daily operations are not maintained as adequate funds are not available to maintain all buildings. Because this trend will continue, the Forest is in the process of re-writing its Facility Master Plan to better manage the facility deferred maintenance back-log.

**What are the implications?** Buildings will continue to deteriorate unless the deferred maintenance backlog is reduced.

**Conclusion.** A variation causing further evaluation and/or change in management direction has been identified in the Facility Master Plan.

#### **Monitoring Resources Available.**

Building Inspections are performed by the Forest on schedule.

#### **Recommendation.**

Continue the inspection process. Implement Facilities Master Plan (FMP), with emphasis on disposal of buildings identified in the FMP for decommissioning. Identify alternative funding sources for buildings identified in FMP for alternative uses. Decommission buildings identified in FMP for alternative use if proper use and adequate alternative funding cannot be identified. Continue safety inspections to identify critical maintenance items to prioritize allocation of funding. Monitoring is required by the Forest Plan and other direction. Monitoring should continue at a rate of 20% per year for five years until 100% of the buildings have been monitored.

### **D. Dam Administration**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Dam Administration	Annual Inspections and reporting.	H/H	Administrative failure to follow-up on unsafe dams

#### **Methods.**

The dams located on the Forest, including those owned by the Forest Service and those owned by others, are inspected according to the hazard class. High-hazard dams are inspected annually, moderate-hazard dams biannually, and low-hazard dams every five years. Most

dams have been inspected according to the schedule with the results being that many have been reconstructed and upgraded to bring them up to State and Federal standards. High hazard dams are inspected by the State, with coordination from the Forest.

### **Variation.**

Administrative failure to follow-up on unsafe dams.

### **Results.**

The Forest dam program has been active in reconstructing and upgrading permitted dams. Beaver Dam, Fish Creek, Coleman Reservoir, Upper Barker, Lower Barker, Joe Lay, Upper Enterprise, and Calf Springs Creek dams have been reconstructed during the last ten years to bring them up to current standards. Tropic Reservoir and Lower Enterprise dams have been core drilled to evaluate structural adequacy. Remote telemetry devices have been installed on Lower Bowns and Spectacle Reservoir dams. A new outlet pipe was installed on Spectacle, a new hydraulic gate was installed on Lower Enterprise, a new outlet gate was installed at Panguitch Lake and the historic rock masonry spillway was repaired at Pine Valley.

An environmental assessment was performed on McGath Dam to reconstruct it and correct its deficiencies. The State of Utah was going to fund and reconstruct the dam, however water rights/conservation pool issues have brought this project to a halt. Inspections are being performed more frequently than the required 5 year interval to continue to monitor the condition of the dam.

Forest-owned dams (Pine Valley, Flat, Robs, Posey, and Pine Creek) continue to be under-funded, and in need of heavy maintenance and/or reconstruction. The Navajo Lake Dam is operated under a shared maintenance agreement between the Forest Service and the State of Utah. It failed twice in the past 10 years. The State of Utah is working on plans to reconstruct the dike and the Forest Service is working on the environmental study required to reconstruct it.

### **Interpretation.**

**Is further evaluation needed?** No.

**What are the implications?** Maintenance items identified during inspections of special use dams are generally repaired in a timely manner. Because maintenance of Forest Service owned dams is dependent on special project funding, it is often deferred until funding is available.

**Conclusion.** The Forest is meeting its obligation to inspect dams on the State mandated schedule. The maintenance of Forest Service owned dams needs to improve.

### **Monitoring Resources Available.**

There are sufficient monitoring resources available to perform the required inspections.

### **Recommendation.**

Continue the annual inspection of the dams according to the dam hazard classifications. The Forest Engineer will coordinate with the State Agency for high and moderate hazard dam inspections. Continue to pursue all funding opportunities to repair/maintain Forest Service owned dams.



## E. Drinking Water Regulation Compliance<sup>11</sup>

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with Utah Public Drinking Water Regulations	Required chemical analyses and reporting every 3 years	H/H	Violation of primary maximum contaminant levels

### Methods.

All Forest Service water systems (see below) are monitored according to state and federal requirements. Federal requirements indicate monthly monitoring for bacteria in accordance with FS guidelines while state requirements indicate quarterly monitoring and reporting. All public water systems are monitored monthly as required by FS guidelines while samples are submitted quarterly to the State of Utah in accordance with state standards. Additional tests for nitrate are performed yearly, and tests for sulfate are performed on a 9 year interval.

Currently the Dixie National Forest is under permit with Scenic Canyons Recreation Services for campground concessionaire. This company is the primary care taker of the water systems located across the Forest with exception to Oak Grove and Tropic Roadside Spring. Their responsibilities include sampling and reporting for the campground water systems.

### Location

The Dixie National Forest currently owns seventeen public drinking water systems that serve twenty campgrounds or rest stops across the forest. The following table reflects the public drinking water systems.

Water System Number	Water System Name	Ranger District	County
27027	Honeycomb Rocks Campground	Pine Valley	Washington
27028	Pine Valley Campground	Pine Valley	Washington
27029	Oak Grove Campground	Pine Valley	Washington
11041	Cedar Canyon Campground	Cedar City	Iron
11019	Deer Haven Campground	Cedar City	Iron
13019	Navajo Campground	Cedar City	Kane
13019	Spruces Campground	Cedar City	Kane
13020	Te-ah Campground	Cedar City	Kane
13022	Duck Creek Campground	Cedar City	Kane
09043	Panguitch Lake North Campground	Cedar City	Garfield
09043	Panguitch Lake South Campground	Cedar City	Garfield
09019	White Bridge Campground	Cedar City	Garfield

<sup>11</sup> This monitoring item is listed under “Water” in the Forest Plan. It is moved to be under the Facilities heading because it involves maintaining safe drinking water with our facilities rather than water quality of surface water.

Water System Number	Water System Name	Ranger District	County
11072	Yankee Meadow Campground	Cedar City	Iron
09044	Red Canyon Campground	Powell	Garfield
09052	King Creek Campground	Powell	Garfield
09047	Tropic Spring Roadside Stop	Powell	Garfield
09017	Pine Lake Campground	Escalante	Garfield
09015	Posey Lake Campground	Escalante	Garfield
09078	Barker Reservoir Campground	Escalante	Garfield
09016	Blue Spruce Campground	Escalante	Garfield

### **Sanitary Surveys for Water Systems on the Dixie National Forest:**

In FY2014 the Forest completed sanitary surveys with the State on seven water systems. The water systems that were surveyed are listed in the following table.

State ID Number	Water System Name	Ranger District	Sanitary Survey Date
27027	Honeycomb Deep Well	Pine Valley	08/27/2014
27028	Pine valley Campground	Pine Valley	08/27/2014
01154	Podunk Guard Station	Powell	06/04/2014
09078	Barker Reservoir	Escalante	06/12/2014
09016	Blue Spruce Campground	Escalante	06/12/2014
09015	Posy Lake Campground	Escalante	06/12/2014
09017	Pine Lake Campground	Escalante	09/05/2014

### **Variation.**

Violation of maximum contaminant levels. Tests performed are: Nitrate and Sulfate contaminant testing and monthly sampling for bacteria.

### **Results.**

All drinking water systems on the Dixie National Forest have been monitored in accordance with State and Federal standards in 2014.

All completed nitrate and sulfate monitoring returned acceptable results. In the event that coliform test results exceeded the allowable maximum contaminant level follow up testing was completed and satisfactory results were obtained.

### **Interpretation.**

**Is further evaluation needed?** Yes. Bacteria limits are occasionally exceeded in some systems. Routine testing for bacteria is performed as an indicator of operational problems. Some positive samples can be expected in most systems.

**What are the implications?** Occasional positive bacterial samples can indicate system operational problems requiring corrections, such as leaks. Routine sampling indicates the presence of problems, allowing for correction.

**Conclusion.** All Forest drinking water systems produce water with contaminant levels below State and Federal standards. No pattern of excessive bacteriological contamination is apparent in the Forest drinking water systems. Continue routine monitoring in accordance with State regulations to insure proper system operation. The Dixie National Forest's water systems are not violating MCL levels and are in compliance with state and federal standards.

**Monitoring Resources Available.**

Adequate funds and resources were available to accomplish the monitoring to the standards required.

**Recommendation.**

The monitoring is required by other direction, in addition to the Forest Plan. Monitoring should be continued at the current rate, as required by State and Federal standards.

## SECTION 16. PROTECTION – FIRE

### A. Fire Prevention Programs

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Adequacy of fire prevention programs	Measure of number and size of person-caused fires annually; report every five years.	H/H	20% increase in cumulative 5-year average

#### Methods.

Fire prevention officers are employed by the Dixie National Forest and work with cooperating agencies (BLM, Park Service, State). They engage in a variety of activities including public education, signing, patrolling, and enforcing fire restrictions. Funding for these positions are included in the preparedness budget.

#### Variation.

20% increase (of number and size of person-caused fires annually) in cumulative five-year average.

#### Results.

We measure the adequacy of our prevention programs by the number of human-caused fires. As shown in the table below, there were seven human-caused fires with a total of 8 acres burned in 2014. The number of human-caused fires is lower than the five-year average of 11 fires, and acreage burned is well below the five-year average of 2,508 acres. Initial attack on human-caused fires was very effective, with one of the seven fires contributing to the majority of the acres (4.5).

**Summary of number and acres of human-caused and lightning-caused fires in 2014.**

Type of Fire	Ignitions	Acreage
Wildfires-lightning	39	587
Human-caused	7	8
Total	46	595

#### Interpretation.

**Is further evaluation needed?** No.

**What are the implications?** None.

**Conclusion.** No variation that would cause further evaluation and/or change in management direction has been identified.

#### Monitoring Resources Available.

Monitoring resources have been allocated for this monitoring.

**Recommendation.**

Continue the fire prevention program and monitoring.

**B. Wildfires**

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Number of wildfires and acres burned	Frequency by size distribution, intensity level, and acres burned annually; report every five years.	H/H	20% increase in cumulative 5-year average for any of the factors

**Methods.**

Number of wildfires and acres burned.

**Variation.**

A 20% increase in cumulative five-year average for any of the factors (size distribution, intensity level, and acres burned).

**Results.**

In 2014, a total of 595 Dixie National Forest acres were burned, well below the five-year average of 2,710 acres. There were 46 wildfires on the Forest, with the majority of the acreage burned occurring on the Pine Valley Ranger District.

The Pine Valley Ranger District of the Dixie National Forest had the largest fire of the season. The Bull Mountain fire started by lightning on July 2<sup>nd</sup> and grew to 435 acres. This fire was in an area that is prone to cheat grass invasion post-fire so a full suppression strategy was employed. An ad-hoc type 3 organization was established by the smokejumpers that were the first to respond during initial attack.

**Interpretation.**

**Is further evaluation needed?** No.

**What are the implications?** The number of fires and acres burned each year fluctuates due to a variety of factors including the number of ignitions and drought.

**Conclusion.** Continue to monitor trends in number and acres of wildfires.

**Monitoring Resources Available.**

Monitoring resources have been allocated.

**Recommendation.**

Continue monitoring.

## C. Fire Management Effectiveness Index

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Fire management Effectiveness Index (FMEI)	Evaluate cost plus net value change during fire annually; report every five years.	M/M	20% increase in FMEI (FFP+FFF+NVC)

### Methods.

The FMEI is not part of NFMAS (National Fire Management Analysis System). It is made up of some of the same components that are used in NFMAS, which is currently used to measure the efficiency of the planned program against historical fire occurrence. Measurements for current years with this method are not possible.

### Variation.

20% increase in FMEI (FFP+FFF+NVC).

### Results.

We no longer use this reporting method because it does not adequately measure success of the fire program. As a surrogate for this obsolete metric, initial action effectiveness is calculated. Of the 46 fires in 2014, only 1 escaped initial action efforts. This equates to a 98% initial action success rate for this year. This high success rate also means that suppression expenditures were minimized. Typically, higher suppression costs are attributable to larger fires.

### Interpretation.

**Is further evaluation needed?** Yes, due to recent changes in fire management planning and emphasis placed on the fire management program from Congress and others, the preparedness budget (FFP in the formula) has risen to a point where it exceeds the previous five-year periods' budgets by 20%. Suppression costs (FFF in the formula) have also risen due to increased use of aircraft and contract resources in recent years that also exceed previous time period expenditures by 20% or more.

**What are the implications?** Changes in the fire program and in measurement criteria in recent years (post-2000) have made this index difficult to measure.

**Conclusion.** There needs to be a new measure determined and implemented. Monitoring of the cost-effectiveness of the fire management program is difficult due to wide fluctuations from year to year based on the number of fires, seasonal weather, and appropriated budget fluctuations. The items listed in the formula above are essentially those things used under the NFMAS system but in a slightly different arrangement to measure the efficiency of various fire program options. This system is being replaced by a new interagency planning system that does not use cost as the measure of efficiency, but rather uses cost and measurable program objectives as the measure of efficiency.

### Monitoring Resources Available.

On the Dixie National Forest, suppression resources and staffing level is determined by the NFMAS process and funded at the appropriate MEL level. Monitoring resources are currently available.

### Recommendation.

Measure the efficiency of the fire program by using number of human starts. Use the number of fires that escape initial attack to measure initial attack efficiency.

## D. Fuel Loading Standard Compliance

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with fuel loading standards	Field measurements after activity or field treatment; sample 30% of projects; report every five years.	M/M	Exceeding fuel level guidelines or 10% failure to make targets

### Methods.

Acres of prescribed fire, wildfire, and mechanical treatments to reduce fuel loading.

### Variation.

Exceeding fuel level guidelines or 10% failure to make targets.

### Results.

The Dixie National Forest used prescribed fire and mechanical treatments to reduce hazard fuels and fuel loading. Fuel treatment effectiveness was monitored across the Forest by establishing and re-measuring sampling locations for both fuels treatments and wildfires. This involved data gathered from 101 plots across the Forest. In 2014, the Forest fuels program completed 11,713 acres of treatments, including 2,952 acres of prescribed fire treatments, 73 acres of fire managed for resource objectives, and 8,688 acres of mechanical treatments.

### Interpretation.

**Is further evaluation needed?** Yes. Limited burning windows, spring dry conditions, fall wet conditions, and a growing dislike of smoke by the public all limited fuel reduction goals. Changes in budget allocation methods have also steered the forest away from larger, landscape type prescribed fire projects into more expensive mechanical treatments further reducing overall accomplishments.

**What are the implications?** The forest is meeting regional assigned targets for fuel reduction but cumulatively we are falling behind on fuel reduction goals to provide resilient landscapes and fire-adapted communities at a larger scale.

**Conclusion.** Continue to monitor and focus on effectiveness of fuel reduction.

**Monitoring Resources Available.**

Pre- and post-treatment monitoring is not occurring on a regular basis. No standard for effectiveness monitoring has been established.

**Recommendation.**

Continue striving to add monitoring capacity for more projects and develop consistent effectiveness standards through an update of the fire/fuels monitoring protocols.



## SECTION 17. PROTECTION – INSECTS AND DISEASES

### A. Insect and Disease Populations

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Population levels of insects and diseases	Annual aerial surveys by R-4 F.P.M.; annual reporting.	M/M	Building of past [pest] populations

#### Methods.

Annual aerial surveys, conducted by the Region's Forest and Pest Management section, have shown that insect activities have been sporadic over the 1987-2014 period. FPM personnel have completed numerous project level insect and disease evaluations during this period. A date visualization project has also been initiated in cooperation with Forest Pest Management which is designed to blend stand data, growth and yield projections, and site photography together in a simulation model to display pest infestation effects over time.

#### Variation.

Building of past [pest] populations.

#### Results.

Localized mountain (*Dendroctonus ponderosae*) and western (*Dendroctonus brevicomis*) pine beetle buildups have been observed over the years, as the sustained drought conditions create greater moisture stress and stand susceptibility, particularly in the older trees. Approximately 2000 mountain pine beetle infested trees were treated in the Panguitch Lake campground in an attempt to retain the important tree cover at that site. In 2002 the campground was non-commercially thinned to reduce tree densities and subsequent risk of bark beetle infestation.

The mountain pine bark beetle, along with limb rust and mistletoe, are slowly killing the over-mature ponderosa pine on the forest.

A spruce beetle (*Dendroctonus rufipennis*) population grew to epidemic levels on the Cedar City District in the early 1990's. The beetle outbreak spread across the Markagunt Plateau resulting in losses of up to 90 percent of the mature and overmature Engelmann spruce trees on thousands of acres. By 2002, the Engelmann spruce subalpine fir forest on the Cedar City District had been altered from a forest dominated by mature Engelmann spruce to one dominated by mature subalpine fir with an understory of mostly subalpine fir, with some Englemann spruce seedling/saplings and variable sized aspen clones.

In the mid to late 1990s, the spruce beetle population grew to epidemic levels on Mount Dutton on the Powell Ranger District. Here, too, the mature/over-mature spruce stands have been replaced with aspen and subalpine fir because of the Engelmann spruce mortality.

Since the early 2000s spruce beetles have been active on the Escalante and Teasdale ranger districts. Aerial Detection Surveys from 2003 to 2007 had estimated more than 100,000

Engelmann spruce trees have been killed by spruce beetle on the Escalante Ranger District. These epidemic outbreaks resulted in replacement of mature/overmature spruce stands with a composition of aspen, subalpine fir, and small diameter sized Englemann spruce. Spruce beetle populations continue to be looked at including annual beetle trap monitoring on the Griffin Top of the Escalante District.

Recently the Douglas-fir bark beetle (*Dendroctonus pseudotsugae*) and fir engraver beetle (*Scolytus ventralis*) populations have been affecting large areas of Douglas-fir and subalpine fir trees.

On a service trip in 2012 by FHP scientists, *Ips pini* was identified in an area of the Cedar City District that had been affected by a 2010 wind event that resulted in many downed ponderosa pine trees. There are likely other areas on the Forest that have experienced this same wind event, or others, that have the potential for *Ips* build up. This small population is currently restricted to one small area, but if treatment does not occur in a short time, there is potential for *Ips* to expand into the tops of live trees in the area, affecting a larger areas.

Root rot continues to be present. A research/treatment program initiated in the Peterson Grove area on the Teasdale District, and localized treatments have been prescribed in timber sale projects. Results of the research and treatments are pending.

### **Interpretation.**

**Is further evaluation needed?** Yes.

**What are the implications?** While spruce beetle infestations have slowed, it is important to continue monitoring their activity in areas that haven't experienced an epidemic. While much of the Cedar City RD has undergone a spruce beetle epidemic, the Escalante RD has not had such widespread epidemics but are at high susceptibility of future infestations. Other insects and disease have increased over the past ten years such as Douglas fir beetle and dwarf mistletoe. These increases have prompted more salvage and delayed other treatment activities such as improving growth in stands of green trees.

**Conclusion.** A variation causing further evaluation and/or change in management direction is needed but has not been identified.

### **Monitoring Resources Available.**

Annual aerial surveys, conducted by the Region's Forest and Pest Management completes this monitoring.

### **Recommendation.**

Continue annual aerial surveys, and other FPM field work.

## B. Dwarf Mistletoe Suppression

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/ RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effectiveness of dwarf mistletoe suppression projects to protect regeneration	Field reviews, follow-up on projects; five-year reporting frequency.	H/H	Infestation in regeneration of pre-commercial thinned areas

### Methods.

Pre-treatment surveys, follow-up surveys are completed to monitor dwarf mistletoe activity and reported in activity databases.

### Variation.

Infestation of dwarf mistletoe in regeneration of pre-commercially thinned areas.

### Results.

Dwarf mistletoe treatments have been prescribed in all affected timber sale project areas initiated during this period, and thousands of acres within individual control projects have been completed. Permanent growth plots have also been established to monitor the long-term effects of mistletoe on tree growth.

Treatment prescriptions and projects have been successful in reducing localized infestation of dwarf mistletoe. However, the disease continues to be widespread in many stands, requiring continued emphasis on treatment and management.

### Interpretation.

**Is further evaluation needed?** Yes.

**What are the implications?** The variation causing further evaluation, “Infestation in regeneration of pre-commercial thinned areas” implies any infestation, which may not be feasible.

**Conclusion.** Disease continues to be widespread in many stands, requiring continued emphasis on treatment and management.

### Monitoring Resources Available.

Resources have been available for the Forest to monitor thinned and reforested areas for mistletoe infestation.

### Recommendation.

Continue the cooperative work with FPM to properly implement and monitor dwarf mistletoe management projects. Develop a variance that better represent effectiveness of dwarf mistletoe suppression.

## SECTION 18. AIR QUALITY

### A. Air Quality Compliance

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Compliance with Utah State Air Quality Guidelines and Standards	Compliance with weather forecast, burning index, ongoing; report as violations occur.	M/M	Adverse public reaction, settling of smoke into inhabited areas

#### Methods.

All prescribed burning is implemented in compliance with the Utah Interagency Smoke Management Program. The Dixie National Forest submits an Annual Burn Schedule containing all planned prescribed burns for the calendar year by March 15 of that year to the Utah Interagency Smoke Management Coordinator. For burns greater than 20 acres or those that produce more than 0.5 PM T/D (particulate matter in tons per day), pre-burn information including the burn plan with day/night smoke flow maps to address sensitive receptors and smoke mitigation measures, must be submitted to the smoke coordinator. Permission to burn is given on a daily basis by the Utah Interagency Smoke Management Coordinator.

#### Variation.

Adverse public reaction, settling of smoke into inhabited areas.

#### Results.

All prescribed burning was implemented in compliance with the Utah Interagency Smoke Management Program. The Forest submitted the annual burn schedule to the Utah Interagency Smoke Management Coordinator as required. Permission to emit smoke was given before each prescribed burn was ignited. In 2014, Dixie National Forest fire managers complied with State Air Quality Standards, with no violations for significantly contributing to particulate matter. Public complaints were monitored by local Ranger Districts and reported to the Utah Interagency Smoke Management Coordinator. There were fewer than ten public comments about smoke concerns for all prescribed fires on the Forest.

#### Interpretation.

**Is further evaluation needed?** Yes, air quality violations did not occur; however, adverse public reactions did occur.

**What are the implications?** Plans for burning are compliant with air quality standards however, there is a growing need to respond to the public's concerns about smoke in their communities. There is a growing challenge associated with managing smoke from prescribed fires to acceptable levels and the Forest's ability to implement the needed projects to create a healthy and resilient landscape.

**Conclusion.** Variation causing further evaluation and/or change in management direction did occur.

**Monitoring Resources Available.**

Air quality monitoring in association with prescribed burning is implemented in compliance with the Utah Interagency Smoke Management Program by the District and Forest Fire Management Officers.

**Recommendation.**

Continue Monitoring. Review this monitoring item in light of likely increased fuels treatment as directed by the National Fire Plan for possible Forest Plan change. The variation that would cause further evaluation and/or change in management direction, “Adverse public reaction, settling of smoke into inhabited areas” may no longer be appropriate.

**Citations**

Utah Interagency Smoke Management Program

## SECTION 19. ECONOMICS

### A. Local Economics

ACTIVITIES, EFFECTS, AND RESOURCES TO BE MEASURED	MONITORING METHOD, FREQUENCY, AND REPORTING FREQUENCY	PRECISION/RELIABILITY	VARIATION WHICH WOULD CAUSE FURTHER EVALUATION AND/OR CHANGE IN MANAGEMENT DIRECTION
Effects on local economies of Forest outputs	District staff reviews and reports of affected sectors annually	[No precision specified in the Forest Plan]	Significant changes in sectors within economic impact areas

#### **Methods.**

District staff reviews and reports of affected sectors annually.

#### **Variation.**

Significant changes in sectors within economic impact areas

#### **Results.**

No data was presented.

#### **Interpretation.**

**Is further evaluation needed?** Unknown.

**What are the implications?** Unknown

**Conclusion.** No data was presented.

#### **Monitoring Resources Available.**

Insufficient data is available.

#### **Recommendation.**

Remove this monitoring item.

## SECTION 20. RESULTS AND RECOMMENDATIONS

### Monitoring Results

There are 85 monitoring items listed in the Forest Plan, including 7 monitoring items added with the Northern Goshawk Amendment. Results of the monitoring reported for the fiscal year 2014 period are summarized below.

Of the 85 total monitoring items in the monitoring identified in the Plan and amendments:

- 21 (25%) indicate a variation causing further evaluation and/or change in management direction.
- 13 (15%) indicate that a change in wording or methods is needed for the monitoring item.
- 13 (15%) need the monitoring item dropped from the forest plan.

Resource	Activities, Effects, and Resources Measured	Recommendation	Is further evaluation needed?
Air	Compliance with Utah State Air Quality Guidelines and Standards	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Cultural Resources	Completion of cultural resource investigation for all site-disturbing projects where no inventory has been completed in the past.	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Developed Recreation	Condition of Facilities (Whether the condition of developed facilities is declining from the current situation)	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.
Developed Recreation	Facility Capacity (Whether construction and reconstruction of facilities is keeping pace with demand)	Continue Monitoring	Yes; Forest could consider adding more group sites.
Developed Recreation	Soil and Vegetative Loss at Developed Sites	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Developed Recreation	Developed Site Service (Whether Forest is able to provide service scheduled in the plan)	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.

<b>Resource</b>	<b>Activities, Effects, and Resources Measured</b>	<b>Recommendation</b>	<b>Is further evaluation needed?</b>
Developed Recreation	Developed Site Use – Amount & Distribution (Does demand exceed supply?)	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Developed Recreation	Downhill Ski Area Use (Is it increasing as projected?)	Drop This Monitoring Item	
Developed Recreation	Organization Site Use	Drop This Monitoring Item	
Dispersed Recreation	Dispersed Visitor Use (Summer and Winter)	Change Wording/Methods	Yes; Traffic counters alone do not give sufficient information to conclude if limits were met. The types of dispersed uses occurring on the Forest were not anticipated in the Forest Plan. The measures prescribed in the Forest Plan are not suitable or sufficient to determine if projected demand has been exceeded.
Dispersed Recreation	Site Conditions (Limits of change)	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.
Dispersed Recreation	Shifts between ROS Classes	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.
Dispersed Recreation	Trail Condition	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Dispersed Recreation	Off-Road Vehicle Travel	Drop This Monitoring Item	
Economics	Effects on Local Economies of Forest Outputs	Drop This Monitoring Item	
Facilities	Road and Bridge Construction and Reconstruction	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.
Facilities	Road Management.	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.



<b>Resource</b>	<b>Activities, Effects, and Resources Measured</b>	<b>Recommendation</b>	<b>Is further evaluation needed?</b>
Facilities	Buildings.	Continue Monitoring	Yes; Buildings that are in use and necessary to support the Forest's daily operations are to be maintained to a reasonable standard. Buildings that are abandoned or do not support the Forest's daily operations are not maintained as adequate funds are not available to maintain all buildings. Because this trend will continue, the Forest is in the process of re-writing its Facility Master Plan to better manage the facility deferred maintenance back-log.
Facilities	Compliance with Utah Public Drinking Water Regulations.	Continue Monitoring	Yes; Bacteria limits are occasionally exceeded in some systems. Routine testing for bacteria is performed as an indicator of operational problems. Some positive samples can be expected in most systems.
Facilities	Dam Administration.	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Fire	Adequacy of Fire Prevention Programs	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.
Fire	Fire management Effectiveness Index (FMEI)	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.

<b>Resource</b>	<b>Activities, Effects, and Resources Measured</b>	<b>Recommendation</b>	<b>Is further evaluation needed?</b>
Fire	Compliance with Fuel Loading Standards	Continue Monitoring	Yes. Limited burning windows, spring dry conditions, fall wet conditions, and a growing dislike of smoke by the public all limited fuel reduction goals. Changes in budget allocation methods have also steered the forest away from larger, landscape type prescribed fire projects into more expensive mechanical treatments further reducing overall accomplishments.
Fire	Number of Wildfires and Acres Burned	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Goshawk	Are mitigation measures (standards and guidelines) employed during vegetative management project implementation sufficient to prevent territory abandonment?	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Goshawk	Is habitat connectivity, as represented by structural and species diversity and dispersion thereof, with and among 5th to 6th order watersheds (or equivalent ecological scale) being maintained?	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Goshawk	Are down woody material and logs being maintained in sufficient amounts, sizes and spatial locations?	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.

<b>Resource</b>	<b>Activities, Effects, and Resources Measured</b>	<b>Recommendation</b>	<b>Is further evaluation needed?</b>
Goshawk	Are grazing utilization standards being met? Goshawk Amendment Page B-3 Are appropriate adjustments made to grazing practices in identified “at-risk” locations where grazing is contributing to the “at-risk” condition?	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Goshawk	Are known goshawk territories on national forests remaining occupied?	Drop This Monitoring Item	This is a duplicate of the Northern Goshawk monitoring.
Goshawk	Is snag habitat (i.e., number and size of snags) being maintained in desired spatial arrangement?	Drop This Monitoring Item	This is a duplicate of the Snag Management monitoring.
Lands	Special Use Permits, Applications, Amendments and Transfers	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Lands	Special Uses (non recreation) Permit Administration and Inspection	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Lands	Construction of Through Utilities	Drop This Monitoring Item	
Lands	Land Survey	Drop This Monitoring Item	
Lands	Land Exchange	Drop This Monitoring Item	
Lands	Rights-of-Way	Drop This Monitoring Item	
Minerals	Exploration Proposals: Adequacy of Permitted Process	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.

<b>Resource</b>	<b>Activities, Effects, and Resources Measured</b>	<b>Recommendation</b>	<b>Is further evaluation needed?</b>
Minerals	Lease/Permit Applications Forms and NEPA Process (Compliance with Regional Standards and Direction)	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Minerals	Site Specific Development Proposals and Administration of Operations, Compliance with Terms of Operating Plans and Existing Agreements	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Minerals	Reclamation Results: Effectiveness of Work Done	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Minerals	Exercise of Reserved and Outstanding Rights by Owner of Minerals	Continue Monitoring	No; Data from 2013 did not indicate further evaluation is needed.
Protection	Population Levels of Insects and Diseases	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Protection	Effectiveness of Dwarf Mistletoe Suppression Projects to Protect Regeneration	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Range	Wild Horse Numbers and Habitat Trends	Continue Monitoring	Yes; Aerial counts and adjusted estimates indicate that populations fluctuate more than 10% annually. Past monitoring has indicated that there are wide fluctuations in population numbers because of annual mortality and colt survival. Reproductive rates vary between 15% and 20%. Utilization levels are being exceeded and rangeland conditions could improve in some areas.

<b>Resource</b>	<b>Activities, Effects, and Resources Measured</b>	<b>Recommendation</b>	<b>Is further evaluation needed?</b>
Range	Range Vegetation Condition and Trend	Continue Monitoring	Yes; Downward range vegetation condition and trends are apparent on the Forest.
Range	Forage Utilization	Continue Monitoring	Yes; Three allotments have exceeded forage utilization standards.
Soil	Soil Compaction	Continue Monitoring	Yes; Additional timber sale administration is needed during periods of high soil moisture to limit soil compaction damage.
Soil	Soil & Water Resource Protection	Continue Monitoring	Yes; Best management practices need further monitoring and emphasis in environmental documents to ensure that they can be implemented properly on the Forest.
Soil	Long-Term Soil Productivity	Continue Monitoring	Yes; Organic matter retention on prescribed fire activities are causing sedimentation concerns.
Soil	Upland Areas Adjacent to Riparian Management Areas	Continue Monitoring	Yes; Willow transplanting has been in-effective in stream restoration projects on areas of the forest.

<b>Resource</b>	<b>Activities, Effects, and Resources Measured</b>	<b>Recommendation</b>	<b>Is further evaluation needed?</b>
Soil	Soil & Water Resource Improvement Needs Inventory	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Soil	Soil Survey Activities	Drop This Monitoring Item	
Timber	Timber Harvest Area	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Timber	Timber Research Needs	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Timber	Verify Classification of suitable and Unsuitable Lands	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Timber	Harvest Practices in Retention, Partial Retention areas.	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Timber	Harvest Practices in Riparian Areas.	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Timber	Adequate Restocking of Stands Within a Reasonable time Period, Generally 5 years of Final Harvest.	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.

<b>Resource</b>	<b>Activities, Effects, and Resources Measured</b>	<b>Recommendation</b>	<b>Is further evaluation needed?</b>
Timber	Maximum Size of Openings Created by Clearcuttings (See also Goshawk Amendment “T”)	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Timber	Reforestation and Timber Stand Improvement Accomplishment	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Timber	Fuelwood Consumption and Supply	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Timber	Growth Response of Regenerated Stands, Precommercially Thinned Stands and Cutover Sawtimber (including effects of insects & diseases)	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Timber	Timber Supply Projections	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Visual Resource	Compliance with Visual Quality Objectives	Change Wording/Methods	Yes; Due to beetle infestations and subsequent harvesting, there are areas that do not meet SIOs.
Water	Accomplishment of Riparian Area Management Goals	Continue Monitoring	Yes; For riparian monitoring sites done in 2014 further evaluation of these sites may be warranted to determine if a change in management direction is needed and able to improve them.

<b>Resource</b>	<b>Activities, Effects, and Resources Measured</b>	<b>Recommendation</b>	<b>Is further evaluation needed?</b>
Water	Compliance with State Water Quality Standards	Continue Monitoring	Yes; Some samples exceeded the State phosphorus criteria levels. The phosphorous exceedences for South Fork Ash and Main Canyon-New Harmony may be attributable to past wildland fires in both watersheds which occurred in 2002 for South Ash Creek and 2012 for Main Canyon.
Water	Effectiveness of Best Management Practice in Meeting Water Quality Objectives and Goals	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Water	Stability of Streambanks in East Fork of Sevier River Drainages	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Water	Effectiveness and Maintenance Needs of Watershed Improvements	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Water	Water Yield Increases in East Fork of Sevier Watershed	Drop This Monitoring Item	
Wilderness	Condition of Campsites and Surrounding area (are conditions declining from the current situation?)	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.
Wilderness	Amount and distribution of Human Use	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.
Wildlife & Fisheries MIS	Big game (mule deer and elk)	Continue Monitoring	Yes; Three mule deer populations or management units within Dixie National Forest are currently above objective. Elk populations are generally above current objective population goals with all units at or above objective.



<b>Resource</b>	<b>Activities, Effects, and Resources Measured</b>	<b>Recommendation</b>	<b>Is further evaluation needed?</b>
Wildlife & Fisheries MIS	Native cutthroat trout: Bonneville/Colorado River	Continue Monitoring	Yes; Water temperature is a violation of State Water Quality Standards.
Wildlife & Fisheries MIS	Nonnative trout: brook, brown, rainbow, cutthroat	Continue Monitoring	Yes; Water temperature is a violation of State Water Quality Standards.
Wildlife & Fisheries MIS	Northern Goshawk	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Wildlife & Fisheries MIS	Northern (common) flicker	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Wildlife & Fisheries MIS	Virgin Spinedace	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Wildlife & Fisheries MIS	Southern leatherside	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.
Wildlife & Fisheries MIS	Wild turkey	Drop This Monitoring Item	
Wildlife and Aquatic Habitat	Habitat Diversity	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.
Wildlife and Aquatic Habitat	Habitat effectiveness for big game species	Change Wording/Methods	Yes; Consider changing wording and methods of monitoring.
Wildlife and Aquatic Habitat	Fish/Riparian habitat	Continue Monitoring	Yes; Bank stability guidelines may not be sufficient to maintain the desired stream channel configuration.
Wildlife and Aquatic Habitat	Snag management	Continue Monitoring	No; Data from 2014 did not indicate further evaluation is needed.